

Coronavirus Crisis: Information and Help in the 2020 Pandemic -

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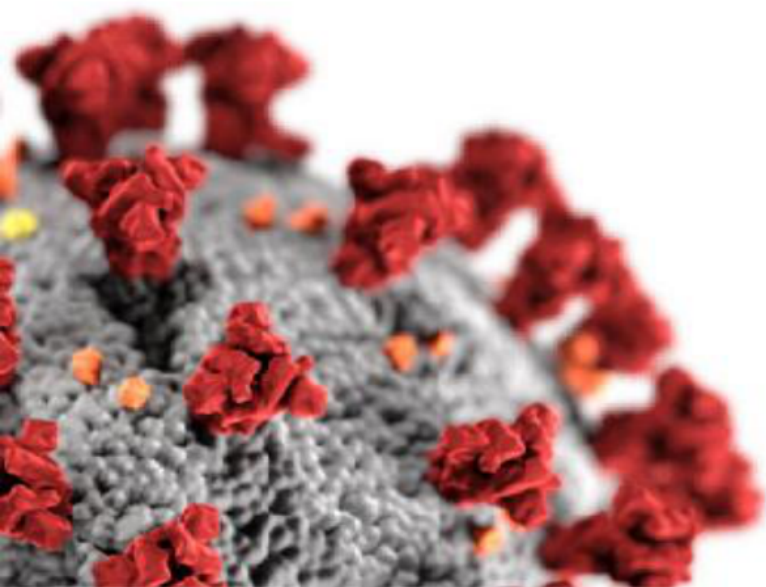
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Medical, hygienic and practical Guide and Textbook in

DR. ANDRÉ HOFFMANN

CORONA- **CRISIS** VIRUS

INFORMATION AND HELP IN THE 2020 PANDEMIC –
WHAT EVERYONE SHOULD KNOW



ATHENEMEDIA

Medical, hygienic and practical Guide and Textbook I

DR. ANDRÉ HOFFMANN

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Corona

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Discussion and Conclusion

About this Book

Dr. André Hoffmann
Corona Crisis
Information and Help in the 2020 Pandemic –
what Everyone should know

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Corona Crisis

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Introduction

A new corona virus is keeping the world in suspense. All continents are affected. It took over three months to reach the first 100,000 confirmed cases of infection, and only 12 days to reach the next 100,000. The number of infected doubled again within six days. On March 30, we had 724,945 confirmed cases and 34,041 deaths (numbers ¹). This virus could be able to trigger a century crisis and claim countless casualties. The consequences for the economies and world trade are not foreseeable. Nobody knows what will happen. Everything is open.

The pathogen initially seemed far, far away – in a southern Chinese province, the province of Hubei. In Wuhan, the capital, there was a certain accumulation of severe pneumonia of unknown cause in December 2019.

On the other hand, the situation on site was taken very seriously: On December 30, 2019, after ophthalmologist Li Wenliang informed colleagues about seven patients he was treating in the central hospital with suspected infection with the SARS virus² , a team – that had been dispatched by the Chinese disease protection agency CCDC – arrived in the city a day later. ³ The World Health Organization (WHO) was immediately informed. By January 3 of this year, 44 patients, some of whom were seriously ill, had been registered. Some of them worked as sellers or traders on the local wholesale market for fish and seafood. This was where science suspects the primary infection. ⁴ , ⁵ On January 7, 2020, virologist Xu Jianguo announced that the pathogen was a previously unknown coronavirus isolated from blood samples and throat swabs. Two days later, the WHO confirmed this. ⁶ By mid-January 2020, the genome sequence was finally isolated ⁷ and a detection method was published. ⁸ , ⁹ , ¹⁰ Since then, disease signs could be assigned to the causer, and the events have been developing rapidly and dramatically ...



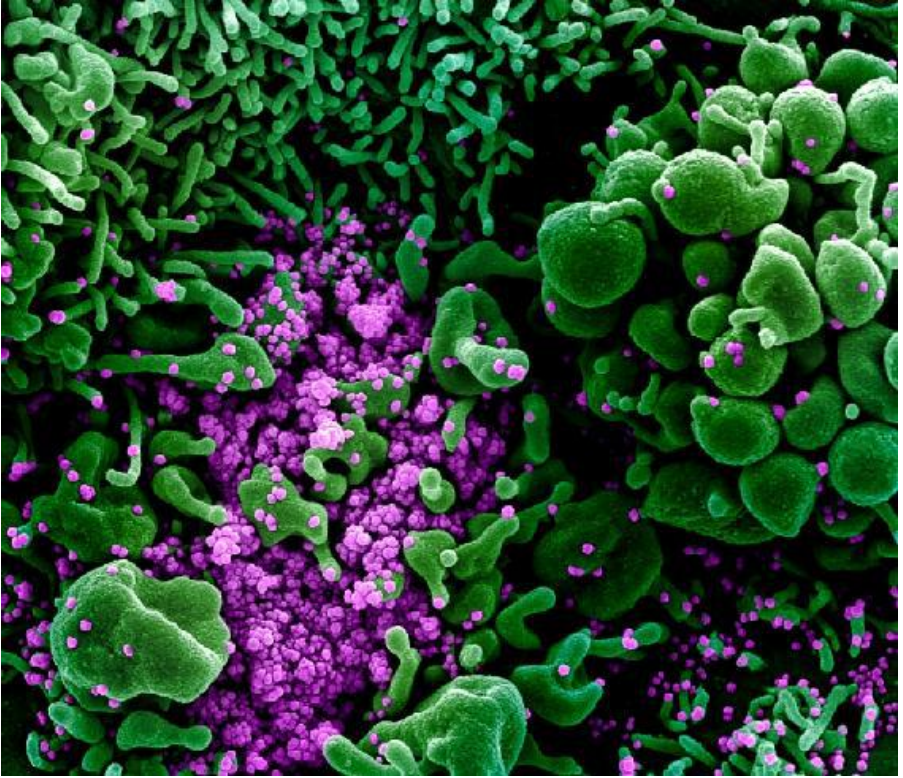
Corona – global case ¹¹

What is a Virus?

Unlike bacteria, viruses are not living beings and they do not have own cells. Therefore, viruses can only multiply within a suitable host cell. They are abusing the metabolism of human, animal, plant, fungal or bacterial cells for their own purposes. The replication cycle of a virus generally begins when a virus attaches to a surface protein on a host cell (adsorption), which the virus uses as a receptor. In bacteriophages, this is done by injecting its genetic material into a cell; in eukaryotes, the virus are invaded by endocytosis and then penetrate the cell of the host. Each type of virus has its own preference for the host organism as well as the type of cells in the organism. Viruses specialize in one or more hosts. To multiply, viruses dock and penetrate appropriate host cells. Therefore, most viruses are significantly smaller than body cells. Their diameter is usually between 30 and 300 nm. Only viroids are smaller, which consist only of a ribonucleic acid. Once in the host cell, the virus must first be freed from its envelopes (uncoating) before replication. These obligatory parasites reprogram the cell in such a way that it begins to produce individual virus components based on the supplied blueprint (the genetic material). Virus reproduction does not occur through growth and division, as in bacterues, but through replication of viral nucleic acid and synthesis of virus-specific proteins. The individual parts of the virus are then assembled into the complete virus in the host cell. The completed viruses then emerge from the host cell.

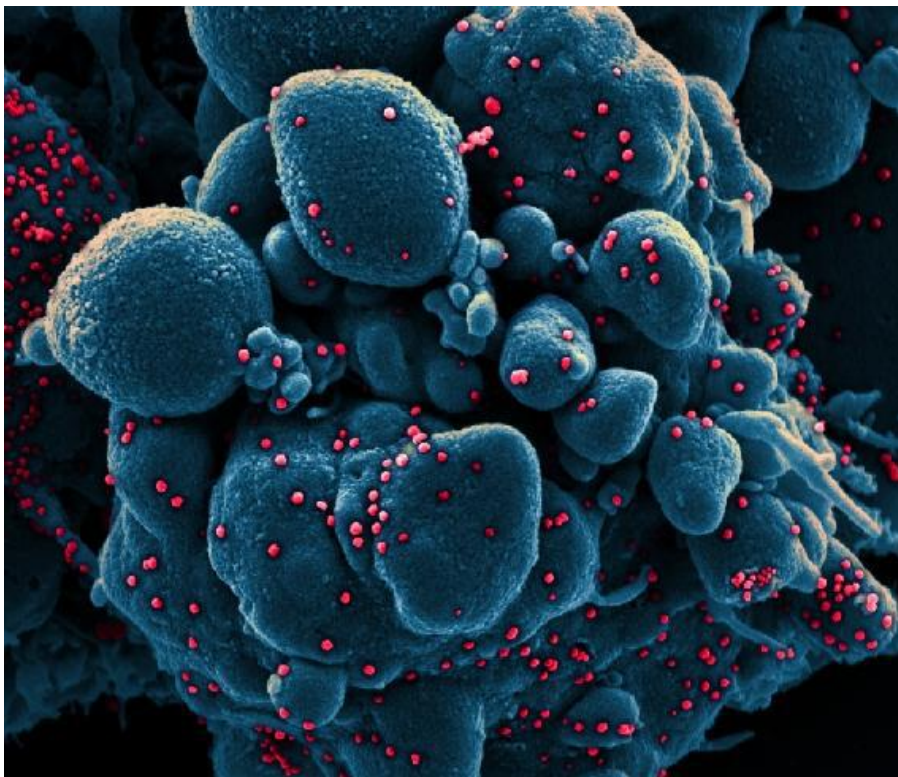
It is not uncommon for host cells to be destroyed. For example, the infected person perceives such destruction when he complains

symptoms of a sore throat.



Colorized scanning electron micrograph of an apoptotic cell (green) heavily infected with SARS-COV-2 virus particles (purple), isolated from a patient sample. Apoptosis is a form of programmed cell death. It is a “suicide program” of individual biological cells. This can be stimulated by internal cell processes (virus activity). Source: NIAID.

Viruses or virions are released either by dissolving the cell membrane (cell lysis), or by secretion (virus budding), taking parts of the cell membrane with them as part of the virus envelope. The immune defense of the host is suppressed with the help of immunoevasins.



Colorized scanning electron micrograph of an apoptotic cell (blue) infected with SARS-COV-2 virus particles (red), isolated from a patient sample. Source: NIAID.

Outside the host cell, the so-called virion or virus particle always has a protein envelope (capsid) that encloses, holds and protects the genetic material. It also functions to attach the virion to its host, and enable the virion to penetrate the host cell membrane. Some types of viruses are surrounded by shell mostly of lipids, proteins and glycoproteins. Glycoprotein extensions protrude like spines from the surface and are called spikes. The spikes help the virus invade host cells.

The structural proteins are usually named according to their function in the virion, i.e. as M protein (matrix) or E protein (virus envelope). In virology, matrix protein (often abbreviated as M protein) refers to those proteins that line the inside of a virus envelope and often also interact with the capsid or ribonucleoprotein inside and the inner portions of the envelope proteins. The space between the capsid and the virus envelope is also referred to as the matrix space.

E protein

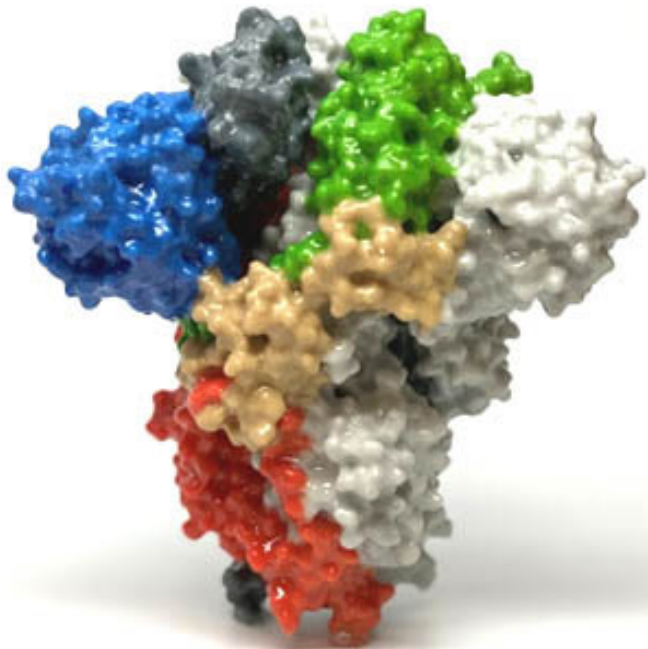
S protein

M protein

COVID-19



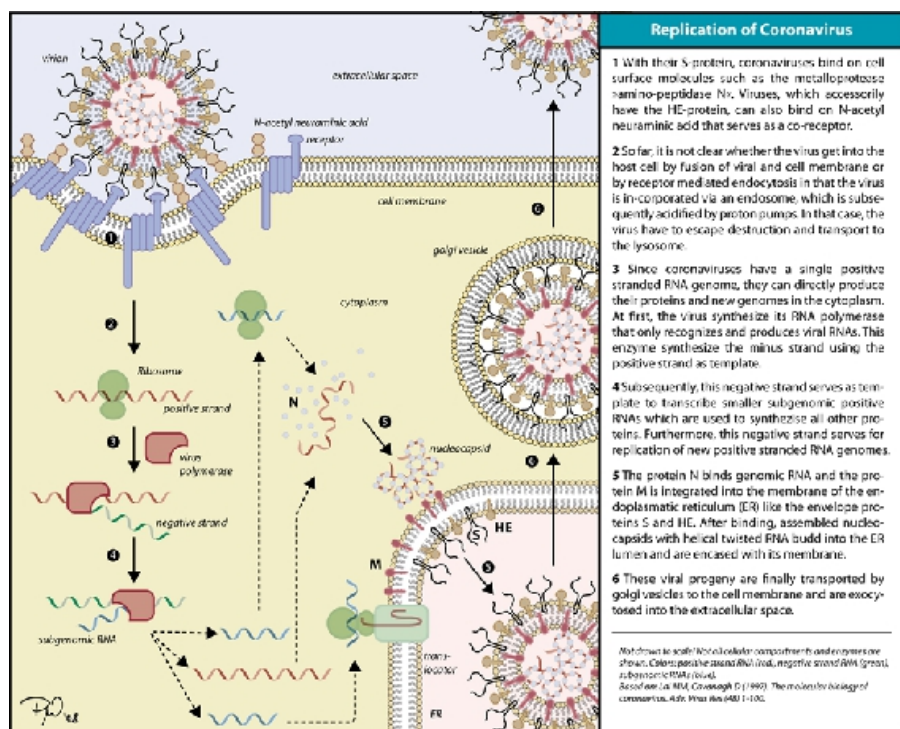
Coronavirus disease 2019 (COVID-19) ¹²



3D print of a spike protein on the surface of SARS-CoV-2 – also known as 2019-nCoV, the virus that causes COVID-19. Spike proteins cover the surface of SARS-CoV-2 and enable the virus to enter and infect human cells. ¹³

The characteristic appearance of the corona viruses is due to the approximately 20 nm outwardly projecting club-shaped structures on the surface, the peplomers, called spikes. They consist of portions of the large glycosylated S protein or spikes protein, which forms a membrane-bound trimer, a macromolecule consisting of three

subunits, here. ¹⁴ These parts carry (S1) the receptor binding domain (RBD), with which the virus can dock to a cell, and (S2) a subunit, which acts as a fusion protein (FP) – fusion of the virus envelope and cell membrane. ¹⁵



The coronavirus replication cycle. ¹⁶

Inside, viruses carry exactly the program as DNA (deoxyribonucleic acid) or RNA (ribonucleic acid) that allows their propagation and spread in and over the host they need. They are almost predestined to “search” for a suitable host.

The better adapted a virus is, the better it can spread through transmission. A virus that causes early symptoms and a serious course of death to its host usually has no good chance of spreading. The virus is “interested” in acting as undetected and symptomless as possible and in persisting infectiously in the host body for a long time in order to infect as many more hosts as possible. As soon as a virus weakens the host, behavioural changes (e.g. social withdrawal, bed rest) threaten to block long routes of infection.

In fact, however, a virus is not mobile and cannot overcome routes without external influences. In reality, the host tends to “find” his virus, for example by meeting infected people or by touching recently contaminated surfaces. The virus is helped by risky human behaviour

and ignorance. The next chapters provide important information and describe which actions a person should avoid and what he can and must do in order not to endanger himself and others.

Viruses relevant to Humans

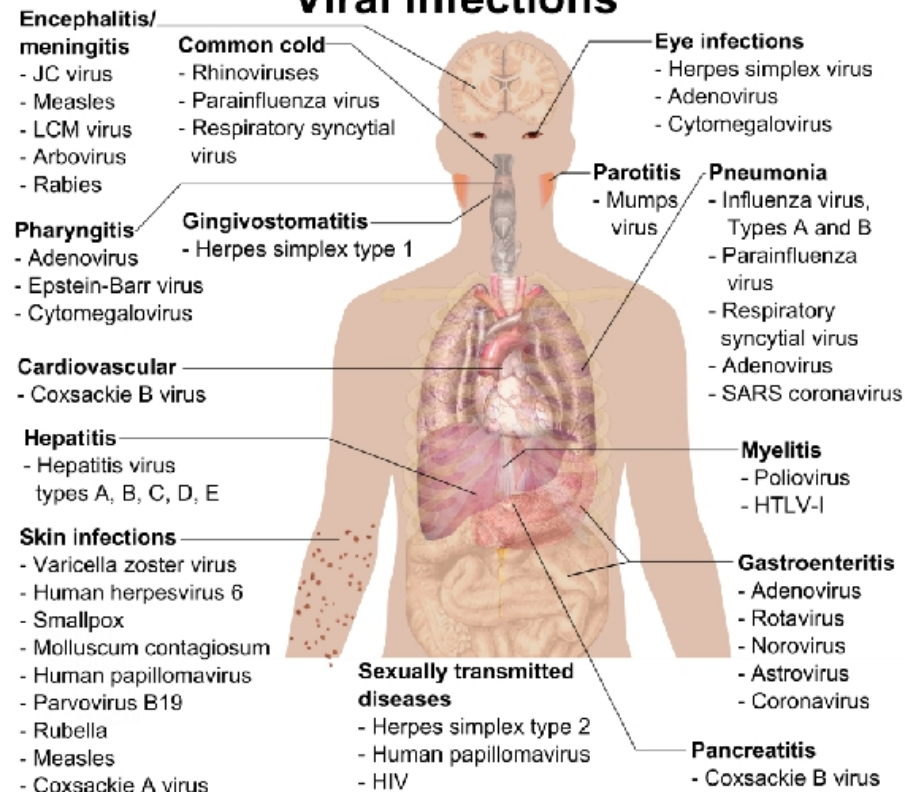
There are different virus families that can be differentiated into subfamilies and genera. Type, structure and reproduction mode of nucleic acid, structural components and virion morphology, strategy of gene expression as well as immunology and behaviour towards inactivating substances determine the classification of viruses. For example, according to the Baltimore classification, viruses can be divided into seven groups based on the shape of the genome:

- I: dsDNA ¹⁷ -Viruses (e.g. Adenoviruses, Herpesviruses, Poxviruses)
- II: ssDNA ¹⁸ -Viruses (e.g. Parvoviruses)
- III: dsRNA ¹⁹ -Viruses (e.g. Reoviruses)
- IV: (+)ssRNA ²⁰ -Viruses (e.g. Picornaviruses, **Coronaviruses**)
- V: (–)ssRNA-Viruses (e.g. Orthomyxoviruses, Rhabdoviruses)
- VI: ssRNA-RT-Viruses (e.g. Retroviruses)
- VII: dsDNA-RT-Viruses (e.g. Pararetroviruses, Hepadnaviruses)

The single-stranded RNA genome of coronaviruses has the longest genomes of all known RNA viruses. ²¹ *Families* relevant to humans or suffering from disease include the following subfamilies, viruses or diseases (exemplary in brackets): *poxviridae* (smallpox, molluscum contagiosum), *herpesviridae* (herpes virus, Varicella-Zoster virus, chickenpox, herpes zoster, shingles), *hepadnaviridae* (hepatitis B virus), *togaviridae* (rubella virus), *flaviviridae* (hepatitis C virus, dengue fever virus, yellow fever virus, FSME virus – early summer meningoencephalitis), *coronaviridae* (cold virus, Merbecovirus, Middle respiratory syndrome coronavirus – MERS-CoV with flu-like symptoms, severe respiratory infection, pneumonia and, if necessary, kidney failure; SARS-associated coronavirus SARS-CoV – SARS with atypical pneumonia, with subtype SARS-CoV-2 [2019-novel coronavirus, 2019-nCoV, or Wuhan seafood market pneumonia virus – covid-19] with lower respiratory tract infection to pneumonia, gastroenteritis viruses), *retroviridae* (leukemia-causing viruses, human immunodeficiency virus, HIV/AIDS), *arenaviridae* (hemorrhagic fever-causing viruses, lassa virus – lassa fever), *bornaviridae* (encephalitis), *bunyaviridae* (pathogen of arbovirosen), *filoviridae* (Marburg virus, Ebola virus), *Orthomyxoviridae* (influenza viruses), *paramyxoviridae* (cold, parainfluenza, measles virus, pneumonia; encephalitis, mumps virus), *pneumoviridae* (Human metapneumovirus – respiratory infection, cold), *rhabdoviridae* (vesicular stomatitis-Indiana virus, rabies virus),

adenoviridae (colds, diarrhea), *papillomaviridae* (warts, cervical tumor/cancer), *reoviridae* (gastroenteritis with diarrhea), *caliciviridae* (norovirus, diarrhea = gastroenteritis, sapovirus – gastroenteritis), *hepeviridae* (hepatitis E virus), *picornaviridae* (enterovirus, polio virus, coxsackieviruses – from cold to meningitis, Pancreatitis or myocarditis, rarely also paralysis, exanthemem, enantheme, herpangina, myoperiarditis, meningoencephalitis in immunosuppressed patients, meningitis, encephalitis, enterovirus, hepatitis A virus, rhinovirus rhinovirus – cold).

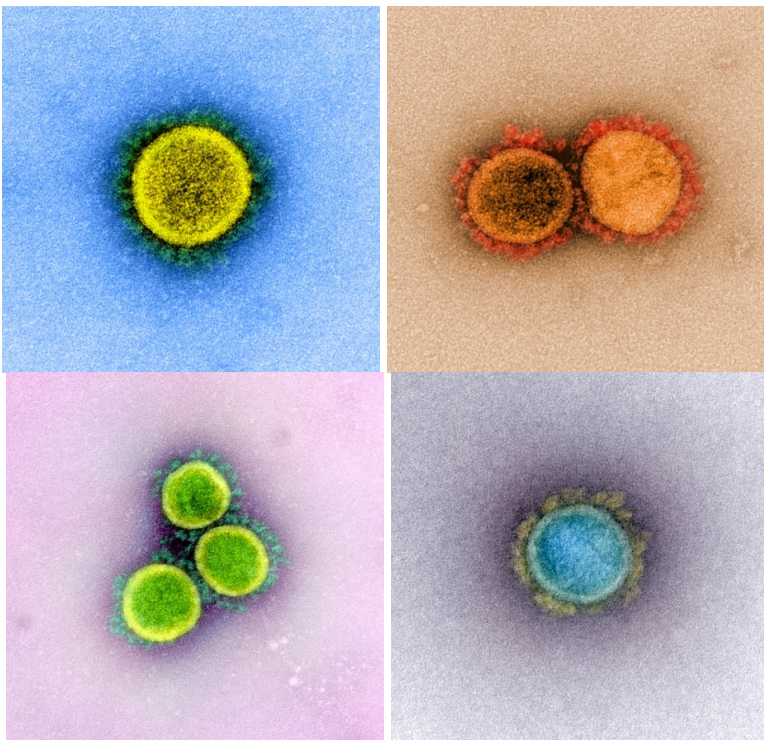
Overview of Viral infections



Overview of viral infections ²²

What is the Coronavirus and what does It do?

Coronaviruses are a large family of viruses that usually cause mild to moderate upper-respiratory tract illnesses, like the common cold, in people. However, three times in the 21st century coronavirus outbreaks have emerged from animal reservoirs to cause severe disease and global transmission concerns.



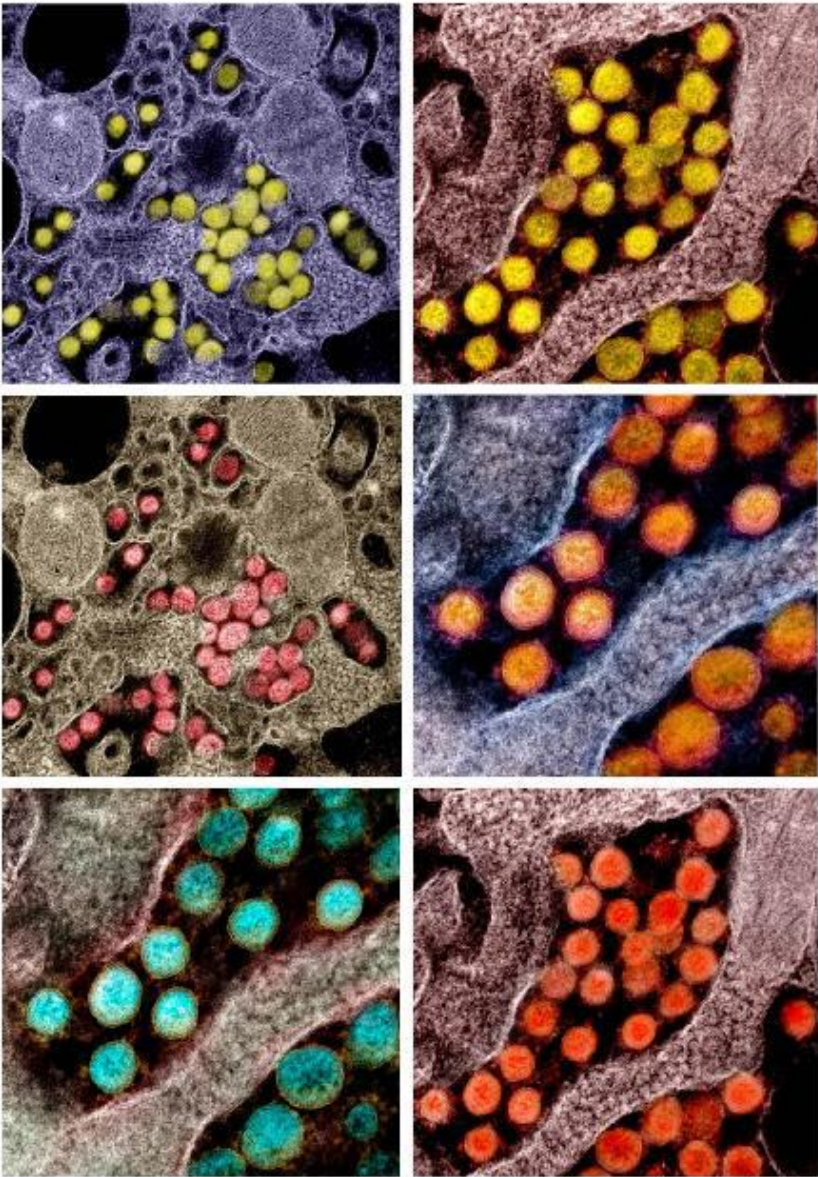
Transmission electron micrographs of SARS-CoV-2 virus particles, isolated from patients. ²³

There are hundreds of coronaviruses, most of which circulate among animals including pigs, camels, bats and cats. Sometimes those viruses jump to humans – called a spillover event – and can cause disease. Seven coronaviruses are known to cause human disease, four of which are mild: so-called viruses 229E, OC43, NL63 and HKU1. Three of the coronaviruses can have more serious outcomes in people, and those diseases are SARS (severe acute respiratory syndrome) which emerged in late 2002 and disappeared by 2004; MERS (Middle East respiratory syndrome), which emerged in 2012 and remains in circulation in camels; and COVID-19, which emerged in December 2019 from China and a global effort is under way to contain its spread. COVID-19 is caused by the coronavirus known as SARS-CoV-2. ²⁴

Transmission Routes

At the beginning of the epidemic in China, Experts suspected that another mammal or poultry could be considered as the main host. However, the transition from the animal to the human also could have been made through an as yet unidentified intermediate host. ²⁵ On

February 28, 2020, the Hong Kong government announced that it had tested positive for the virus for the first time, living in the homes of its infected keepers. ²⁶ The WHO confirmed that the SARS-CoV-2 samples had been tested “weakly positive”. ²⁷



Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient.¹

¹ Image captured and color enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID.

In this context, Chinese researchers pointed to snakes such as the multiband Krait (*Bungarus multicinctus*) and the Chinese snake ²⁸ , which are sold alongside other wild animals on the wholesale market

mentioned in the introduction. This hypothesis has been declared unlikely by other virologists, as there is no evidence to date that coronaviruses can also infect reptiles. Until now, coronaviruses have only been found in mammals and birds.²⁹ After a coronavirus with a high genetic match to SARS-CoV-2 was found in Malaysian pangolin animals (Sunda pangolins), they were suspected to be the origin of the pandemic, especially since they are traded in China despite the ban.³⁰ ,³¹ Due to the similarity of the binding domain (RBD) of the spike protein to the human receptor ACE2, the Java horseshoe bat (Rhinolophus affinis) in which the virus isolate BatCoV RaTG13 was found is now considered (as of February 17, 2020). as an even more promising candidate for the origin of the virus, although it is not clear whether the transmission took place directly. On 20 January 2020, the Chinese Health Commission announced that human-to-human transmission was possible,³² ,³³ in particular when two persons have close contact with each other (less than 1.8 m apart³⁴ or less than 1–2 m distance³⁵).

The main route of transmission appears to be droplet infection.³⁶ “Droplet transmission occurs when respiratory droplets generated via coughing, sneezing or talking contact susceptible mucosal surfaces, such as the eyes, nose or mouth. Transmission may also occur indirectly via contact with contaminated fomites with hands and then mucosal surfaces. Respiratory droplets are large and are not able to remain suspended in the air thus they are usually dispersed over short distances.”³⁷ In theory, smear infection and infection through the conjunctiva of the eyes are also possible. Droplet infection, it can be assumed that the main transmission takes place via droplets.³⁸ ,³⁹ There is no evidence of a aerosol infection. But it could be possible.⁴⁰ In principle, a transmission by smear infection or infection by contaminated surfaces is not excluded. It is not known what role it plays. Infection chains have often been identified, which can best be achieved by direct transmission, e.g. were explained by droplets. Positive stool samples⁴¹ ,⁴² ,⁴³ were identified in COVID-19 patients. The virus has so far been detected in the secretion of the nasal and throat, in the sputum, the stool, the tear fluid and the blood.⁴⁴ ,⁴⁵ ,⁴⁶ Viruses must be able to multiply for infection via stool, something that has not been shown so far. Conjunctivitis as a gateway, in three (out of 63 examined) patients with COVID-19 pneumonia, conjunctival samples were PCR-positive.⁴⁷ This is not clear evidence that conjunctiva can act as a gateway, but should be assumed – especially in the medical field. Vertical transmission from the (infected) mother to her child (before, during, after birth), there are only a few studies that have investigated this question.⁴⁸ ,⁴⁹ ,⁵⁰ ,⁵¹ No evidence of transmission could be provided in the newborns of COVID-positive

mothers examined so far. There are isolated reports of newborns in which SARS-CoV-2 has been detected, but in these cases it is unclear whether the transmission occurred during pregnancy, during childbirth or after childbirth, so that no conclusions can be drawn from this.

An observational study of nine people found no vertical transmission from mother to the newborn. ⁵² Also, a descriptive study in Wuhan found no evidence of viral transmission through vaginal sex (from female to partner), but authors note that transmission during sex might occur through other ways. ⁵³ National Center for Immunization and Respiratory Diseases (NCIRD) , Division of Viral Diseases reports: ⁵⁴

Symptoms and Course of the Disease

Reported illnesses have ranged from mild symptoms to severe illness and death for confirmed coronavirus disease 2019 (COVID-19) cases. These symptoms may appear **2-14 days after exposure** (based on the incubation period of MERS-CoV viruses): Fever, Cough, Shortness of breath. If you develop **emergency warning signs** for COVID-19 get **medical attention immediately** . Emergency warning signs include, for example: trouble breathing, persistent pain or pressure in the chest, confusion or inability to arouse, bluish lips or face ... Please consult your medical provider symptoms that are severe or concerning.



Content source: National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases.

The infected may be asymptomatic, many develop flu-like symptoms including fever, cough, and shortness of breath. Less commonly, upper respiratory symptoms such as sneezing, runny nose, or sore throat may be seen. Gastrointestinal symptoms such as nausea, vomiting, and diarrhoea are in a minority of cases, and some of the initial Chinese cases presented with only cardiac symptoms, like chest tightness and palpitations. In some, the disease may progress to pneumonia, multi-organ failure, and even death: The course of the disease is non-specific, varied and varies widely, from asymptomatic courses to severe pneumonia with lung failure and death. Therefore, no general statements can be made about the “typical” course of the disease. From the accumulated cases recorded in China, the most common symptoms reported are fever and cough. Around 80% of the illnesses were mild to moderate. “Mild to moderate” affects patients with or without pneumonia, without difficulty breathing, with blood oxygen saturation of over 93% and without (CT-diagnosed) lung infiltrates that affect more than half of the lungs.



Informationen über das Coronavirus

Wie gefährlich ist das Virus?

- Die Infektion verläuft in den meisten Fällen mild und ist für die meisten Menschen nicht lebensbedrohlich.
- Das Virus kann grippelähnliche Symptome wie Husten, Abgeschlagenheit, Fieber oder Atembeschwerden auslösen.
- Den meisten erkrankten Menschen helfen bereits Ruhe, viel trinken und, bei Bedarf, fiebersenkende Medikamente.



Wie wahrscheinlich ist es, dass Sie sich mit dem Virus infizieren?

- Sie können sich nur anstecken, wenn Sie einer Person nahe waren, die bereits mit dem Virus infiziert ist.
- Die Möglichkeit, sich anzustecken, ist inzwischen auch in Deutschland gegeben.
- Wenn Sie sich in Gebieten aufgehalten haben, in denen bereits viele Menschen infiziert sind, erhöht sich auch Ihr Infektionsrisiko.

Wie kann man dazu beitragen, die Verbreitung des Coronavirus einzudämmen?



Halten Sie ausreichend Abstand von Menschen, die Husten, Schnupfen oder Fieber haben – auch aufgrund der andauernden Grippe- und Erkältungswelle.



Halten Sie die Hände vom Gesicht fern – vermeiden Sie es, mit den Händen Mund, Augen oder Nase zu berühren.



Niesen oder husten Sie in die Armbeuge oder in ein Taschentuch – und entsorgen Sie das Taschentuch anschließend in einem Mülleimer mit Deckel.



Waschen Sie regelmäßig und ausreichend lange (mindestens 20 Sekunden) Ihre Hände mit Wasser und Seife – insbesondere nach dem Naseputzen, Niesen oder Husten.

Verlässliche, seriöse und laufend aktualisierte Informationen zum Coronavirus und Hygienetipps finden Sie auf der Internetseite www.infektionsschutz.de



Was sollten Sie tun, wenn Sie sich unwohl fühlen?

Wenn Sie grippelähnliche Symptome haben, vermeiden Sie unnötige Kontakte und bleiben Sie zu Hause. Falls Sie ärztliche Hilfe benötigen, kontaktieren Sie telefonisch Ihre Hausärztin oder Ihren Hausarzt. Eine telefonische Anmeldung ist besonders wichtig, wenn Sie den Verdacht haben, sich mit dem neuen Coronavirus angesteckt zu haben.

In dringenden Fällen rufen Sie die 116117 an.

Information poster of the German Federal Ministry of Health and Federal Centre for Health Education.

SYMPTOMS OF CORONAVIRUS DISEASE 2019

Patients with COVID-19 have experienced mild to severe respiratory illness.

Symptoms* can include

FEVER



COUGH



***Symptoms may appear 2-14 days after exposure.**

Seek medical advice if you develop symptoms, and have been in close contact with a person known to have COVID-19 or if you live in or have recently been in an area with ongoing spread of COVID-19.

SHORTNESS OF BREATH



10/17/2020 4:41 PM

For more information: www.cdc.gov/COVID19-symptoms

Educational or information material from Centers for Disease Control and Prevention (U.S. Department of Health & Human Services).

Fourteen percent were severe (with shortness of breath, oxygen saturation below 94%, or lung infiltrates in more than half of the lungs), but not life-threatening and in 6% the clinical course was critical to life-threatening (with lung failure, septic shock or multiple organ failure). Outside of Wuhan / Hubei and outside of China there are some observations that the proportion of mild courses is higher than 80%.

The proportion of serious illnesses also depends on how the cases were identified. Bi et al. reported that the proportion of serious cases was only 3% when discovered through contact tracking.⁵⁵ The median age among Chinese sufferers is 51 years old and around 78% of cases are between 30 and 69 years old. At the age under 20 years, patients are hardly affected at 2.4%. The risk of infection in China is roughly the same for men and women.⁵⁶

Risk Groups and severe Courses

An evaluation of the English-language and Chinese articles published in mid-February 2020 concludes that all population groups can be infected⁵⁷ : Of those infected, 72% were 40 years of age or older, and 64% were male. 40% of patients had chronic conditions such as diabetes mellitus and high blood pressure.⁵⁸ This is confirmed by the report of the WHO-China Joint Mission in China, which continues to list cardiovascular diseases, chronic respiratory diseases and cancer. In addition, people over the age of 60 have a higher risk of developing a serious course of the disease.⁵⁹ Infected people aged 70 to 79 years and even more likely to die from COVID-19 are more likely than average.⁶⁰ A follow-up to the similarly severe viral disease MERS, which occurred mainly in Arab countries and also attacks the lungs, identified smoking as a separate risk factor.⁶¹ In its most recent summary on COVID-19, the Robert Koch Institute (RKI) makes the same assessment under item 2, "Risk Groups for Severe Gradients".⁶² Although severe courses often also occur in people without previous illness⁶³ , the following groups of people have an increased risk of serious progression⁶¹ :

elderly persons (with a steadily increasing risk of severe course from about 50-60 years)

- Smokers
- Persons with certain pre-existing conditions:

- of the heart (e.g. coronary heart disease),
- of the lungs (e.g. asthma, chronic bronchitis),
- patients with chronic liver disease),
- patients with diabetes mellitus (sugar disease),
- patients with cancer,
- Patients with weakened immune systems (e.g. due to a disease that is linked to immunodeficiency or by taking medications that weaken the immune system, such as cortisone).

Children of all ages are susceptible to the disease, but are likely to have milder symptoms and a much lower chance of severe disease than adults; in those younger than 50 years, the risk of death is less than 0.5%, while in those older than 70 it is more than 8%.⁶⁴ , ⁶⁵ In some patients COVID-19 may affect pneumonia. COVID-19 may rapidly progress to acute respiratory distress syndrome (ARDS) causing respiratory failure, septic shock, or multi-organ failure.⁶⁶ , ⁶⁷ Complications include sepsis, abnormal clotting, damage to the heart, kidneys and liver. Clotting abnormalities, specifically an increase in prothrombin time, have been described in 6% of those admitted to hospital with COVID-19, while abnormal kidney function is in 4% of this group.⁶⁸ Liver injury as shown by blood markers of liver damage is frequently.⁶⁹ Many of those who die have preexisting conditions, including hypertension, diabetes mellitus, and cardiovascular disease.⁷⁰ The Italian Istituto Superiore di Sanità reported that, out of over 2000 deaths from the disease in the country, 99.8% had at least one preexisting condition with the average patient having 2.7.⁷¹ , ⁷² The median time between onset of symptoms and death was eight days with a difference of one day between patients who were been treated in an intensive care unit compared to those who were not.⁷³ In a study of early cases, the median time from exhibiting initial symptoms to death was 14 days, with a full range of six to 41 days.⁷⁴ In a study by the National Health Commission (NHC) of China, men had a death rate of 2.8% while women had a death rate of 1.7%.⁷⁵ Histopathological examinations of post-mortem lung samples show diffuse alveolar damage with cellular fibromyxoid exudates in both lungs. Viral cytopathic changes were observed in the pneumocytes. The lung picture resembled acute respiratory distress syndrome (ARDS). In 11.8% of the deaths reported by the National Health Commission of China, heart damage was noted by elevated levels of troponin or cardiac arrest.⁷⁶ Availability of medical resources and the socioeconomics of a region may also affect mortality.⁷⁷

Pregnancy

Acquisition of the infection, currently there is no data on susceptibility to SARS-CoV-2 infection in pregnant women⁷⁸ : Pregnant women are at particular risk for severe infection.⁷⁹ , ⁸⁰ In a study of nine patients who had suffered SARS Cov2 infection in the last third of pregnancy, all nine children were virus-free after giving birth by caesarean section. From this, the study authors concluded that transmission of the virus did not take place in the womb.⁸¹ Due to physiological adaptation and immunological changes during pregnancy, increased susceptibility to SARS-CoV-2 infections cannot be ruled out. Severity of the course of

the disease in pregnant women, there have been few studies to date in which pregnant women with COVID-19 have been studied. ⁸², ⁸³ These studies, as well as the results of the “WHO-China Joint Mission on Coronavirus Disease 2019”, do not indicate a more severe course of COVID-19 in pregnant women compared to non-pregnant persons. It is possible that an increased risk of a severe course can only be reliably investigated in population-based studies. Unborn children, so far there is very little data on this question, especially no long-term data, so no valid statements can be made on this question. Basically, high fever during the first trimester of pregnancy can increase the risk of complications and malformations. Very little data are available on children's histories. According to previous studies, the trajectories in children appear to be rather mild and non-specific. ⁸⁴ To date, no information is available on the long-term effects of COVID-19. Among cases with reported symptoms, cough (58%), fever (43%) was most commonly and sniffles (38%). ⁸⁵

Infectivity and its Duration

Infectivity describes a pathogen's ability to infect a host. It is therefore dependent on the pathogenicity factors and thus on the ability of a pathogen to invade a host and a reproduction in it ⁸⁶ : Infectivity is determined, among other things, by the laboratory-determined number of newly formed pathogens per cell (burst size, resulting in one dose, occasionally in a titer), the minimum dose of infection and the epidemiological R_0 value or Basic reproduction number (see below) of the pathogen. The term contamination, on the other hand, describes how easily or severely a pathogen can be transmitted on the various routes of infection typical of the pathogen. However, the terms contagiousity and infectivity are synonymous. Knowledge of the infectivity of the pathogens responsible for a disease is important in order to be able to estimate how a disease can behave in the event of an outbreak and whether hygienic measures or disease-hygienic measures may be necessary. (for example, quarantine). Jump to search In epidemiology, infectivity is the ability of a pathogen to establish an infection. More specifically, infectivity is a pathogen's capacity for horizontal transmission that is, how frequently it spreads among hosts that are not in a parent-child relationship. The measure of infectivity in a population is called incidence. Infectivity has been shown to positively correlate with virulence. This means that as a pathogen's ability to infect a greater number of hosts increases, so does the level of harm it brings to the host. A pathogen's infectivity is subtly but importantly different from its transmissibility, which refers to a pathogen's capacity to pass from parent to child. Basic reproduction

number, the analysis of the data from the first 425 cases in Wuhan showed a baseline reproduction rate of 2.2, which means that each infected person had infected an average of 2.2 other people.⁸⁷ A model calculation with Chinese and foreign patient data from December 31, 2019 to January 28, 2020 showed a value of 2.68.⁸⁸ In comparison, a base reproduction rate of 2.3 to 2.6 was calculated for SARS.⁸⁹ A comparative analysis of 12 studies published up to 7 February 2020 concludes that the base reproduction rate is higher than previously assumed by the WHO, whose estimate is between 1.4 and 2.5.⁹⁰ The scientists from Sweden, China and Germany estimated that the average base reproduction rate is 3.28, the median 2.79 (with an interquartile distance of 1.16), which is above the level of SARS, which they give as 2 to 5. Due to insufficient data, the current estimates of the mean base reproduction number may be distorted.⁹¹ Various studies show the number of secondary infections originating in a case (basic reproduction number R_0) between 2.4 and 3.3. Individual studies with significantly higher estimates were not taken into account. This value can be interpreted as requiring about two-thirds of all transmissions to be prevented in an R_0 of about 3 in order to bring the epidemic under control.⁹² Duration of infectivity, in a study of nine patients, the excretion dynamics of propagating viruses from samples of the throat and sputum were investigated.⁹³ Smear samples from the throat contained repropagating viruses up to the fourth day after the onset of symptoms, from the sputum to the eighth day after the onset of symptoms. Neither in the stool (available samples from the sixth day after the onset of symptoms), nor in urine or serum could propagating viruses (in the urine and serum also no SARS-CoV-2 RNA) be detected.

Incubation Time

The serial interval, in the epidemiology of communicable (infectious) diseases, refers to the time between successive cases in a chain of transmission.⁹⁴ The serial interval defines the average interval from the onset of the disease of a contagious case to the onset of a case infected by the disease. The serial interval is usually longer than the incubation period, because contagion generally occurs only when a case has become symptomatic. The serial interval in one study of 425 patients averaged (median) was 7.5⁹⁵ and in another study an estimated four days, based on the analysis of 28 infector/infected pairs.⁹⁶

Preliminary estimates of median incubation period are 5-6 days, but ranging from 0-14 days, and estimates for the serial interval (4.8) range from 4.4 to 7.5 days. The incubation period indicates the time

from infection to the onset of the disease. [97](#) , [98](#) , [99](#) , [100](#) , [101](#) , [102](#) , [103](#) It averages 5-6 days [104](#) , a span 1 to 14 days. [105](#)

Lethality

The Robert Koch Institute reports ¹⁰⁶ : On February 24, 2020, the WHO-China joint mission conducted by WHO in China, based on data from Wuhan and other regions, concluded that 2-4% of those infected died in Wuhan, in other Chinese regions 0.7%. ¹⁰⁷ Case fatality rate (CFR): The case fatality rate (CFR) depends on the availability of healthcare, the typical age and health problems within the population, and the number of undiagnosed cases. ¹⁰⁸ Preliminary research has yielded case fatality rate numbers between 2% and 3%; in January 2020 the WHO suggested that the case fatality rate was approximately 3%, and 2% in February 2020 in Hubei. ¹⁰⁹ Other CFR numbers, which adjust for differences in time of confirmation, death or remission but are not peer reviewed, are respectively 7% ¹¹⁰ and 33% for people in Wuhan 31 January. ¹¹¹ 55 deaths, an unreviewed article noted that early estimates of mortality may be too high as asymptomatic infections are missed. They estimated a mean infection fatality ratio (IFR, the mortality among infected) ranging from 0.8% to 0.9%. The outbreak in 2019–2020 has caused at least 244,517 edit confirmed infections and 10,030edit deaths. However, the time lag in death occurring can mean the mortality rate is underestimated. ¹¹² , ¹¹³ For the case-death rate, the number of reported deceased cases could be divided by the number of reported cases, e.g. in China, or alternatively, by the number of known endpoint cases (recovered and deceased cases). The former quotient would underestimate the final proportion (since not all patients know the endpoint and patients with longer disease progression are more likely to be fatal), while the latter ratio would overestimate the final proportion. On 27 February 2020, for example, the first share for cases reported by China was 3.5% ($2,747 / 78,514$), and the second 7.7% ($2,747 / [32,926 + 2,747]$). Both shares are approaching each other when the endpoint is known from more and more reported cases. In the other Chinese provinces, the proportion of the deceased was significantly lower (0.8% [103 deaths / 13,004 cases] on 26.02.2020, outside China (1.5% [44 / 2,918])). The (corrected) number of deceased passengers in the passengers of the cruise ship “Princess Diamond” was estimated at 2.3% and the (corrected) infected-deceased at 1.2%. ¹¹⁴ At the press conference on COVID-19 on 3 March 2020, the WHO Director-General spoke of 90,893 COVID-19 cases reported worldwide and 3,110 deaths and a 3.4% reported mortality rate. ¹¹⁵ In contrast, a WHO study ¹¹⁶ cited by Mike Famulare, Institute for Disease Modeling, estimated the actual mortality rate for COVID-19 infected persons, i.e. the statistical probability that a person who had been found to be infected, regardless of individual characteristics, died between 0, 4 and 2.6%,

the most likely value being 0.94%.¹¹⁷ In an epidemiological analysis of 99 hospitalized cases, 11% had died by January 25, 2020, 31% were discharged and 58% were still in the hospital. This study is a first indication that the lethality of hospitalized patients is approximately 11%.¹¹⁸ A recent study estimates a case-death rate of 5% in Hubei Province and 0.8% for China (excluding Hubei).¹¹⁹ Guan et al. quantify the number of cases of deceased in a patient group of 1,099 people (interquartile range, IQR: 35-58 years, mean [median]: 47 years) at 8.1% (14 / 173) in severe diseases (ventilation or sepsis) and 0.1% (1 / 926) in mild diseases (total 1.4%). Among patients with very severe course (ITS or lung failure), the case-death rate was 22% (15 / 67). Lethality describes the number of deceased cases as a proportion of the number of (actually) cases. There are no reliable data available because the actual number of people with the disease is unknown and may be significantly higher than the number of reported cases. If the number of cases falling by a factor of 4.5-11.1 is actually underestimated, then this would probably be the number of (lighter) sufferers who would not be covered by the monitoring system. This would probably reduce lethality (closer to reality) by a similar factor.¹²⁰

Complications, their Times and Duration

The lungs are the organs most affected by COVID-19 because the virus accesses host cells via the enzyme ACE2, which is most abundant in the type II alveolar cells of the lungs. The virus uses a special surface glycoprotein, called “spike“, to connect to ACE2 and enter the host cell.¹²¹ The density of ACE2 in each tissue correlates with the severity of the disease in that tissue and some have suggested that decreasing ACE2 activity might be protective,¹²² ¹²³ though another view is that increasing ACE2 using Angiotensin II receptor blocker medications could be protective and that these hypotheses need to be tested.¹²⁴ As the alveolar disease progresses, respiratory failure might develop and death may follow.¹²⁵ The Robert Koch Institute reports on the times¹²⁶ : Time from onset of disease to pneumonia, in one publication (Chinese case series [n = 1,099]) this period was four days [IQR]: 2-7 days).¹²⁷ Time from the onset of the disease to hospitalization, in a Chinese case series (n = 138 hospitalized cases, including many nosocomial infections [n = 57], also among medical personnel [n = 40]), this average (median) period was seven days (IQR: 4-8 days). Another study reported a period of 4.5 days (IQR: 2-7 days) for mild illnesses and 5 days (IQR: 4-6.8 days) for severe histories. Time from the onset of the disease to acute lung failure (ARDS), in one Chinese case series (see 9th), this average time span (median) was eight days (IQR: 6-12 days), and in another publication (n = 298 patients) 9 days (IQR: 7-11 days).¹²⁸ Time from

the onset of the disease to treatment in the intensive care unit, in a Chinese case series (see 9th), this average (median) was 10 days (IQR: 6-12 days). Time from hospitalization to admission to an intensive care unit, in a Chinese case series (see 9th), this average time was one day (IQR: 0-3 days). ¹²⁹ Duration of hospital stay, in a Chinese case series (see 9th), this average period (median) was 10 days (IQR: 7-14 days; indicated for the previously recovered). This figure is probably an underestimation: the report of the “WHO-China Joint Mission on Coronavirus Disease 2019” states that mild cases have an average (median) course of disease of two weeks and severe cases of 3-6 weeks. ¹³⁰

The German Robert Koch institute states ¹³¹ : This proportion of hospitalized among the sick usually gives an impression of the proportion of patients who have had a course that is difficult enough to arrange inpatient treatment. However, in both China and probably most other countries, this proportion is distorted by the fact that laboratory-confirmed or suspected cases of isolation have been admitted to hospital, not because of their severe course. Therefore, this percentage cannot be calculated at this time. Other indicators must therefore be used to assess the frequency of severe gradients. Proportion of hospitalized with ventilation, There are various sources with a wide range of ventilation frequency, but the proportion within Hubeis seems to be significantly higher at around 20-25% than for the whole of China (2-6%). ¹³² , ¹³³ Proportion of hospitalized people treated on intensive care unit, There is no reliable information on this. In one Chinese case series (see 9.) 26% (36 / 138) received intensive medical treatment and in another (n = 99) it was 23%. In a series of cases outside Hubei, on the other hand, a proportion of 2% (1 / 62) was treated in an intensive care unit. ¹³⁴ Percentage of invasive ventilated with extracorporeal membrane oxygenation (ECMO), There is no reliable information on this. In a Chinese case series (including many nosocomial cases, including medical staff), 24% patients with ECMO / 17 invasively ventilated patients) were treated with extracorporeal membrane oxygenation (temporary technical lung replacement therapy). Chen et al. report 43% patients with ECMO of 7 invasively ventilated patients). Another study reported 6% (2 patients with ECMO of 32 invasively ventilated patients). ¹³⁵

Asymptomatic or presymptomatic Excretion and Transmission

The authors explicitly pointed out the risk of the virus spreading by non-complaint patients in early stages of infection. ¹³⁶ Measurements of the viral load in the secretion of the nasal cavity result in a similarly

high viral load between pain-free and symptomatically ill patients.¹³⁷ Based on quantitative viral examinations in the secretion of the nasal cavity in patients with very mild symptoms, the researchers of the Virology of the Charité and the Institute of Microbiology of the Bundeswehr concluded that even with very mild symptoms of the disease have a high capacity for infection.¹³⁸ The Robert Koch Institute also reports on individual cases in which sufferers may have been infected in infected individuals who had not yet shown any or no specific symptoms: Overall weak evidence, Asymptomatic excretion was described in a person whose excretion was similar to that of 17 symptomatic patients.¹³⁹ Asymptomatic transmission, an asymptomatic person from Wuhan may have infected five other family members¹⁴⁰ ; In the context described, however, a transfer by an unknown other person to all family members would be conceivable. It is unknown if past infection provides effective and long-term immunity in people who recover from the disease.¹⁴¹ Immunity is likely, based on the behaviour of other coronaviruses¹⁴² , but cases in which recovery from COVID-19 have been followed by positive tests for coronavirus at a later date have been reported.¹⁴³ ,¹⁴⁴ It is unclear if these cases are the result of reinfection, relapse, or testing error.

Concerns have been raised about long-term sequelae of the disease. The Hong Kong Hospital Authority found a drop of 20% to 30% in lung capacity in some people who recovered from the disease, and lung scans suggested organ damage.¹⁴⁵

Under-recording

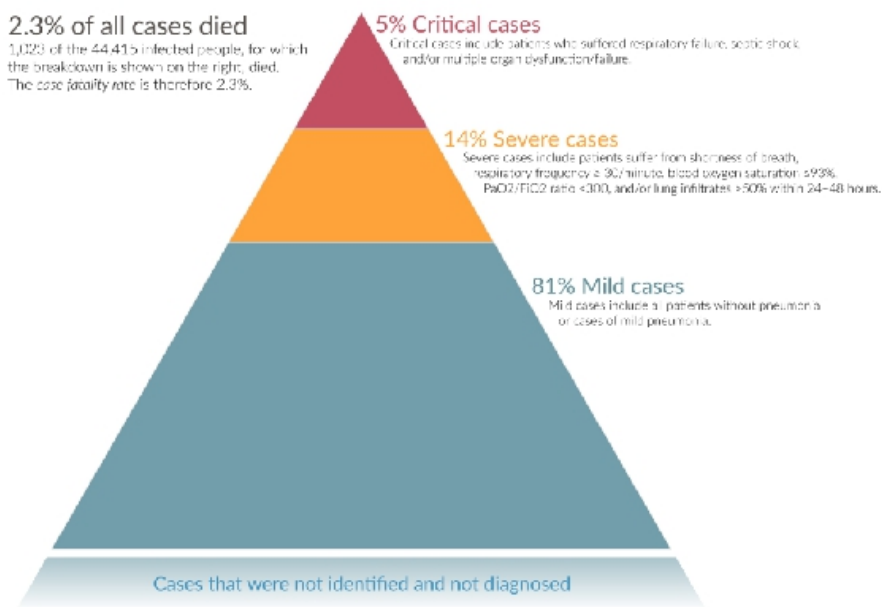
The number of sufferers indicated by surveillance systems is always subject to the risk of a more or less severe distortion due to the case definitions used. In any survey system there is a need to treat individuals on the basis of certain characteristics (symptomatic; laboratory tests). Thus, only one subset is recorded at a time. The actual number of sufferers must therefore be estimated frequently.¹⁴⁶

The proportion of infected people who actually fall ill, there is no reliable data because the actual number of people infected and the actual number of cases are unknown. Serological surveys would be necessary to determine the actual number of infected persons. A first small study from Japan gives a figure of 58%.¹⁴⁷

With all caution and uncertainty, three studies could be used to estimate under-reporting: a study, which was still based on data from January 2020, estimated the proportion of people infected in China's surveillance system at 5%¹⁴⁸ , a second study estimates the proportion at 9.2%.¹⁴⁹ Thus, the number of infected persons would be greater than specified by a factor of 20 or 11.

A third study builds on the fact that 1,916 people worldwide had

been repatriated on 2 February 2020 and that 17 of these 17 had tested positive for SARS-CoV-2. ¹⁵⁰ This corresponds to a share of about one percent. From this, the authors concluded that about 110,000 (95% confidence interval: 40,000-310,000) people in Wuhan should be infected. With a manifestation index of 58% (see below), this would correspond to a number of around 64,000 people who have fallen ill. By comparison, the WHO gave a total of 14,411 cases in China on February 2. ¹⁵¹ If the above factor 20 ¹⁵² or 11 ¹⁵³ and a manifestation index of 58% were used, an estimated number of approximately 168,000 persons or 92,000 persons would have been ill at that time. Thus, according to the three estimates, 22% (factor 4.5), 16% (factor 6.3) and 9% (factor 11.1) of the patients would have been covered by the monitoring system. ¹⁴⁵



The severity of diagnosed COVID19 cases in China ¹⁵⁴, ¹⁵⁵

If the disease were to spread widely in Germany, the number of COVID-19 cases with a visit to the doctor would be estimated by modelling data from data from the Influenza.

Tenacity and Inactivation on Surfaces.

An analysis of 22 studies looking at the persistence of medically relevant coronaviruses (such as SARS-CoV and MERS-CoV) on surfaces shows that these viruses survive at room temperature for up to nine days on surfaces made of metal, glass or plastic: ¹⁵⁶ On average, they remain infectious for four to five days. However, they are

inactivated by suitable agents. According to the scientists involved, these findings should be transferable to SARS-CoV-2. ¹⁵⁷ On the other hand, the US National Institutes of Health, based on quantitative studies of the viral load in various scenarios, state that transmission by contaminated objects and surfaces occurs, since the virus has a several hours outside the human body. ¹⁵⁸ Other human-pathogenic coronaviruses are known to survive for a certain amount of time on inanimate surfaces such as metal, glass or plastic. The survival time depends on other influencing factors such as ambient temperature and humidity. ¹⁵⁹ , ¹⁶⁰ For example, while in a study HCoV-229E on plastic lost its infectivity after 72 hours, SARS-CoV-1 remained infectious on the same medium for up to six days. ¹⁶¹ Due to the structural similarity of SARS-CoV-1 and SARS-CoV-2, a similar tenacity is to be expected for SARS-CoV-2. Surface sanitizers with proven limited virucidal efficacy are suitable for inactivation. Disinfectants with the ranges of action limited viruzid PLUS and viruzid can also be used. ¹⁶² , ¹⁶³

Prevention and Protection

How dangerous is the virus? For most people, the disease is not so bad. And they will recover. The disease is similar to a flu: people have coughs and fevers. They are often very tired. And can breathe badly. This already helps most people with the disease: resting. Drink a lot. And take medication for fever. How and where can you get sick? When you get close to people. And these people are sick. Then you can also get the disease. If you've been to places where a lot of people have the disease. Then you might get the disease as well. If you stay away there, you may not get the disease. The virus has also arrived in Germany. Here you can also get sick. How can I protect myself and other people? What can you do if you feel sick? Do you feel sick? Just like a flu. Then stay at home. And stay away from other people. If that's possible. If you need a doctor: Call your GP. Always call first! That is important. Especially if you have contracted the new Corona virus.

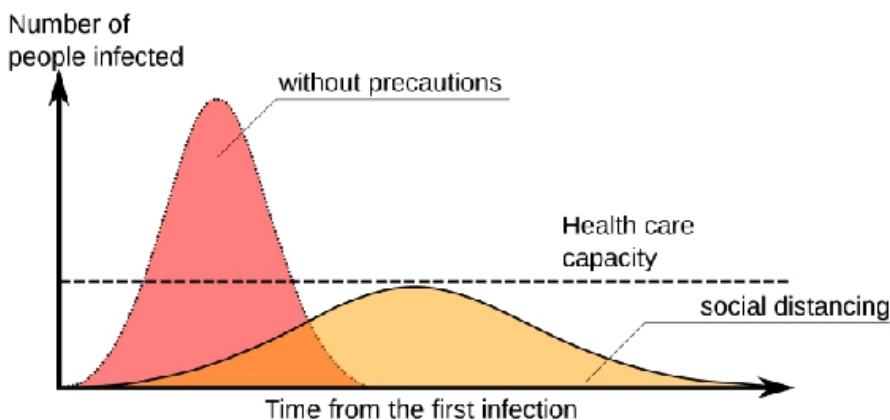
Social Prevention

The aim of social prevention is to stop or slow down the spread of an epidemic as far as possible. In addition to the characteristics of the virus, the spread of an epidemic is largely characterised by the social behaviour of human beings. Therefore, hygiene measures, early diagnosis and the management of contact persons (investigation and, for example, home isolation or quarantine) are the first measures to prevent or slow down the further spread of the virus. In a novel

pathogen, an attempt is made to suffocate the spread in the initial stage and eliminate the pathogen by means of containment strategy. The measures are ¹⁶⁴ :

- identification and isolation of infected persons;
- Identification of infection chains;
- Identification of all contact persons and tracking their status;
- general prevention.

The strategy. Because a vaccine against SARS-CoV-2 is not expected to become available until 2021 at the earliest, ¹⁶⁵ a key part of managing the COVID-19 pandemic is trying to decrease the epidemic peak, known as flattening the epidemic curve through various measures seeking to reduce the rate of new infections. Slowing the infection rate helps decrease the risk of health services being overwhelmed, allowing for better treatment of current cases, and provides more time for a vaccine and treatment to be developed. ¹⁶⁶



Flattening of the pandemic wave: rapid increase in the number of sufferers (red) without protective measures; slower spread (when they come into force from the first case of infection) as all patients are cared for (yellow) ¹⁶⁷

In the case of further dissemination, various measures are taken, all of which aim at the so-called social distancing, i.e. the increase of the social distance, the reduction of contact. For social proximity determines the basic number of reproductions, i.e. the amount of people infected by an infected person, in the case of pathogens that are transmitted from person to person. These measures include: Call and recommendations for contact reduction to the population ¹⁶⁸ ; closure of public facilities, such as schools, kindergartens, etc.; Cancellation of events; requirements for business, trade, transport, etc.; Quarantine.

When a pathogen becomes endemic, it is no longer considered to be containable and eradicated, the precautionary objectives change from combating the spread towards slowing down and health care. The

primary objective at this stage is to flatten the course of the disease, so that as many sick as possible do not burden the health system at the same time in order to maintain it. The National Pandemic Plan for Germany defines the following objectives:

- reducing morbidity and mortality in the general population;
- ensuring the care of sick people;
- maintaining essential public services;
- reliable and timely information for policy makers, professionals, the public and the media.

Experts call for special protection of risk groups such as the elderly and people with pre-existing conditions. ¹⁶⁹ The virologist Christian Drosten of the Berlin Charité therefore recommended that families should no longer give their children to their grandparents for care in the near future. He also suggested making purchases for the elderly so they wouldn't have to go to the supermarket. Employers should, if possible, allow chronically ill people to work from home. ¹⁷⁰ The entire population is called upon to avoid unnecessary social contacts. ¹⁷¹

Individual Prevention

Prevention by immunization by vaccination is not yet possible, work is being done on the development of coronavirus vaccines, which can be individually contributed by providing computing power. The individual can minimize the risk of infection for himself by reducing contact and hygiene.

Specifically, the World Health Organization (WHO) recommends ¹⁷² :

- Wash your hands regularly and thoroughly with water and soap or with an alcohol-based hand sanitizer
- keep at least 1 (2) meter away from people who sneezing or coughing
- do not touch eyes, nose or mouth if possible
- sneezing into the arm bend or coughing or in a handkerchief, which must then be disposed of immediately. The Federal Centre for Health Education recommends turning away from other people when coughing, sneezing or brushing your nose and washing your hands thoroughly after every cough, sneezing or nose brushing.
- stay at home if you feel sick (except, of course, to go to the doctor)
- in case of fever, cough and shortness of breath, consult a doctor and call in advance
- even with mild symptoms (such as mild running nose or headache).

The German Federal Minister for Health recommends ¹⁷³ :

Behavioural recommendations for Protection against Coronavirus in Everyday Life and in

Coexistence

Private environment and family life. Stay at home as often as you can. In particular, restrict personal encounters with elderly, elderly or chronically ill people to protect them. Instead, use more communication by phone, email, chats, etc. Please observe visiting arrangements for hospitals and other care facilities. Ventilate all lounges regularly and avoid touches such as shaking hands or hugging. If a person in your household is ill, if possible, ensure a spatial separation and sufficient distance from the other household members. Do not shop at peak times, but when the shops are less crowded or use pick-up and delivery services. Help those who need help! Provide elderly, elderly, chronically ill relatives or neighbours, and single and needy people with food and everyday necessities.

Public transport and travel. If possible, do not use public transport, but prefer to cycle, walk or drive your own car. If possible, avoid travelling – even within Germany. Many borders are closed and air traffic is limited. Professional environment. Work from home, in consultation with your employer. Keep meetings small and short and in a well-ventilated room. Keep a distance of 1 to 2 meters from other people and avoid personal touches. If possible, take your meals alone (e.g. in the office). Stay at home if you're sick and cure yourself!

Public life. Avoid crowds (e.g. shopping malls, etc.) Visit public institutions only where strictly necessary, such as offices, administrations and public authorities. If possible, avoid larger private celebrations and otherwise consistently comply with the hygiene rules.

Information on Coronavirus for Patients

Up-to-date information on coronavirus can be used at local health office. Patients, the medical personnel and relatives are particularly vulnerable, because people with pre-existing conditions are particularly at risk of having severe history of viral diseases such as the coronavirus. When the medical personnel get infected, there is also a major problem for the care of patients. Please pay attention to the following rules: Please wash your hands regularly and thoroughly with water and soap for at least 20 seconds. Please disinfect your hands regularly. Keep sufficient distance from other people – especially patients and visitors. Close contact with medical staff cannot always be avoided in diagnostics, therapy and care. The medical staff shall ensure that this is reduced to what is absolutely necessary. Avoid physical contact (handshake, hugs) with visitors as well as with other patients. Do not shake hands with hospital staff, even if it is well-intentioned. Instead, choose a different form of greeting without direct

contact. Sneezing or coughing in the arm bend or in a handkerchief – and then dispose of the handkerchief in a garbage can. Keep your hands away from your face – avoid touching your mouth, eyes or nose with your hands.

Information on Coronavirus for Hospital Visitors

Patients in hospital need our special protection and are particularly at risk of additional infections, such as coronavirus, taking serious course. Please help us to protect patients in the best possible way and protect yourself! Please ask yourself immediately: Is my visit really necessary? With each visit, viruses like the coronavirus increase in the likelihood that viruses like the coronavirus will spread in the hospital. Your own risk of infection also increases. If your visit is not strictly necessary, please let it be. For individual exceptions, please call the station. Instead, use other ways to communicate with your family or friends, such as phone, email. If your visit is absolutely necessary, please pay attention to the following rules: Please disinfect your hands before contacting the patient and leaving the room. Keep sufficient distance from other people, especially patients and staff. Avoid physical contact (hugging) with patients. Sneezing or coughing in the arm bend or in a handkerchief – and then dispose of the handkerchief in a garbage can. Keep your hands away from your face – avoid touching your mouth, eyes or nose with your hands.

Information on Coronavirus for nursing Home Visitors

Older people need our special protection and are particularly at risk of viral diseases, including those caused by the coronavirus, from serious progression. Please help us to protect the residents of this facility in the best possible way and protect yourself! Please ask yourself immediately: Is my visit really necessary? With each visit, viruses like the coronavirus are more likely to spread here in this facility. Your own risk of infection also increases as a result. If your visit is not mandatory, please repent. If your visit is necessary, please pay attention to the following rules: Please disinfect your hands regularly. Keep sufficient distance from other people – especially the residents and the staff. Avoid physical contact (handing, hugging) with the residents. Sneezing or coughing in the arm bend or in a handkerchief – and then dispose of the handkerchief in a garbage can. Keep your hands away from your face – avoid touching your mouth, eyes or nose with your hands.

Tips for Parents

The coronavirus outbreak (SARS-CoV-2) and its effects are currently reported worldwide. Media reports and other information also reach many children. For example, images of people in protective suits and breathing masks can be threatening. Children are very aware of the way their families and their social environment – friends, kindergartens, schools, etc. – deal with the current situation. Parents and other caregivers therefore face the challenge of talking to their children about this potentially stressful situation and, for example, organising multi-day domestic quarantines. Changed behaviors Each child reacts to stress or stress individually. Insecure children can feel uncomfortable or tired, restless, nervous or anxious. They can be irritated, aggressive or otherwise “different” than usual. Appetite or concentration may decrease, or the sleep and sleep routines may be de-energized. Some children may exhibit behaviors that are no longer appropriate to their level of development: they are particularly affectionate, react strongly to farewell or separation situations, or speak in baby language again. Sometimes children may be soaking or peeking again. Other physical symptoms such as nausea, abdominal or headaches may also occur.

What can help children?

Try to be there for your child. Often it is a great help when a familiar reference person is nearby.

A structured daily routine with fixed sleep and meal times provides stability and security. Make sure that the familiar is kept as well as possible, and now keep your agreements and commitments with a particularly reliable level.

Within the limits of the possibilities and taking into account the current information on contact with other people: Make sure that your child is physically active (cycling, playing the ball, etc.) and can also spend time in the fresh air. A healthy diet is always important, especially now.

Create periods during which your child can relax and easily play.

Protect your child from over-reporting. Being confronted with certain images and descriptions again and again does not help and can unsettle you, even yourself.

If your child would like to sleep in your bed again, this can be useful – if it is feasible for you and your family.

How do I explain the situation to my child? Support your child with care and patience. Give it the ability to process and adapt to the current situation.

Talk to your child about the current situation. Listen carefully and patiently as it tells of impressions, even if it repeats itself.

If your child asks questions, answer them honestly. Say openly if you don't know something yourself. You can then think together about who can give you the answer you want.

Teach facts and explain what is happening. Give your child clear,

comprehensible and age-appropriate information, e.g. on how to prevent infection. This may include discussing what you will do if a family member or the child himself shows symptoms of illness. Also explain what is being done to help those affected and prevent further spread of the pathogen.

Explain to your child why visits to friends, grandparents, or other caregivers may not be possible at this time.

If you are stressed or anxious, do not hide your own concern, but talk openly about it. Help your child understand why you are reacting the way you do.

How do I support my child in home quarantine? Quarantine is a protective measure. However, it can also be a burden, especially if there are also children living in the household who can no longer go to kindergarten or school or who are to be separated as much as possible by other people living in the household. Explain the current situation to your child in age-appropriate terms and explain why certain measures need to be taken at the moment.

Explain to your child why visits from friends, grandparents, or other caregivers are currently not possible. Allow your child to share with these reference persons (e.g. by phone, internet and social media). If you have the opportunity to use video telephony, this can increase the sense of contact and community.

Create a daily structure, precisely because the routines of attending kindergarten or school are currently no longer necessary. For example, plan fixed meal times, times to learn or play. Involve your child in the planning. Fixed times to find out about the current situation can also be part of it.

Respond to food requests. Ask neighbors and friends to err and worry for you and bring toys if necessary.

Contact the school: It is often used to provide work materials that can be processed at home.

Children have a different experience of the time than adults. For example, paint a calendar - similar to an advent calendar - and swipe every day of quarantine so that the time span becomes more tangible for your child.

Even if there is no adequate replacement for the playground or outdoor play, allow your child to exercise. By movement, tension and stress can be reduced. In a limited space, room trampolines, elastics or jumping ropes can help.

Try relaxation exercises with your child. Suggestions and hints especially for children can be researched on the Internet.

Offer your child the opportunity to exercise mentally, e.g. by reading, writing tasks.

Keep a positive attitude: this can also be applied to your child and conveys confidence and security.

Even if you can only partially restrict physical contact with your child: Explain to him why you reduce it, e.g. with regard to your partner and what this is for.

Tips for Home Quarantine ¹⁷⁴

Novel infectious diseases, such as the coronavirus (SARS-CoV-2), are unsettling many people. This is understandable, because the situation is unusual. If the disease spreads rapidly and occurs more often regionally, it does not only affect physical health. Then it can also be psychologically stressful.

As COVID-19 spreads, more and more people are wondering what this means for their daily lives. An epidemic disease is a challenge for every individual as well as for society as a whole and requires cooperative, prudent and helpful behavior.

Anxiety and uncertainty in novel viruses. An epidemic is a rapidly developing situation, which is often accompanied by a great deal of uncertainty, especially at the beginning. Pathogens such as coronaviruses cannot be detected by the naked eye and have no perceptible odour. They cannot be grasped by our sensory organs. They are only recognizable by medical evidence and by the disease they bring with them.

Thus, for many, the pathogens are like an unpredictable “invisible enemy” from which one can only partially protect oneself. Sometimes, out of a sense of insecurity, even the exclusion of people who are actually or supposedly carriers of disease.

Concern for the health and health of family and friends can cause feelings of insecurity and anxiety, of helplessness or even loss of control. These sensations and reactions are normal. Legal regulations in the case of quarantine. The Infection Protection Act (IfSG) ¹⁷⁵ provides various legal instruments for measures to prevent and combat disease. For example, the competent authorities, e.g. the health authority, may oblige persons not to leave the place or not to enter certain places until the necessary protective measures have been carried out. 30 IfSG allows quarantine to be one of the most intrusive measures. It is used to prevent further spread of the disease. The competent authorities shall check compliance.

Domestic quarantine: Protective measure and stress situation, the quarantine situation is a protective measure. However, it can also be a burden, as it largely excludes potentially ill persons from participating in social life. Important social resources, such as those offered by professional or family life, are reduced. When the quarantine lasts longer, thoughts often revolve around the disease, its effects and physical condition. Therefore, it is important to pay attention to the preservation of one's own mental well-being.

Practical tips

Remember that preventive hygiene measures such as cough and sneezing labels are also necessary in quarantine, especially if more than one person lives in your household.

You may suddenly have an unusual amount of time, as you cannot go to work or pursue your usual leisure activities. Create a daily structure and set goals. The objectives should be realistic in the circumstances. Consider how you can fill the time. Try different things like reading, writing a diary, etc.

Stay in touch with family and friends, e.g. via phone and social media.

Ask friends or neighbors to shop for you or get medication. Health boards also often offer support.

If you have a dog as a pet, ask friends or neighbors to go for a walk with it for quarantine time.

If you feel depressed, do not hesitate to seek help and support early on. Your family or other social environment can be an important support for this. Telephone pastoral care can also be a point of contact ...

Stay physically active: Sports can also be done in a limited space, e.g. by exercises on a chair or on the floor. There are many hints and suggestions on the Internet. • Stay mentally active, e.g. by reading, writing, (thinking) games, etc.

Try relaxation exercises if you feel tense. There are also for inexperienced relaxation techniques that are easy to learn (e.g. progressive muscle relaxation). There are also many hints and suggestions on the Internet.

Accept your feelings: Being involuntarily in home quarantine can provoke various emotional reactions. These are normal reactions to the abnormal situation.

Be critical: there is a lot of misinformation circulating. Check with trusted sources, e.g. on the website of the Robert Koch Institute (www.rki.de). The Federal Ministry of Health, the state ministries and the health authorities also provide reliable information. Your family doctor is of course also a serious contact person.

Try to make media consumption more aware of this topic. For example, set fixed times when you search for new news and information.

Keep a positive attitude and orientate yourself to values that give you support (e.g. family, social network, faith).

For educational Institutions 176

How dangerous is the novel coronavirus? Infection with the novel coronavirus can lead to signs of illness such as coughs, colds, neck scratches and fever, sometimes diarrhea. After infection, symptoms of the disease can occur up to 14 days later. The infection is not life-threatening for most people, including children. In some of those affected, the virus can lead to a more severe course with breathing problems and pneumonia. Deaths have so far occurred mainly in patients who were older and/or previously suffered from chronic underlying diseases. Not enough data are yet available for a final assessment of the severity of the new respiratory disease. At present, there is no vaccine available to protect against the novel coronavirus.

How is the novel coronavirus transmitted? The novel coronavirus is transmissible from person to person. The main transmission route is droplet infection. This can be done directly via the mucous membranes of the respiratory tract or indirectly via hands, which are then brought into contact with the oral or nasal mucosa as well as the blindfold.

How to avoid the transmission of the coronavirus? In general, it is important to note ... Keep as much distance as possible when coughing or sneezing – it's best to turn away. Sneez into the arm bend or into a paper towel, which you then dispose of. Avoid touching when greeting other people, and wash your hands regularly and thoroughly with water and soap for at least 20 seconds. Good hand hygiene is important ... upon arrival at an educational institution such as daycare centres or schools, after breaks and sports activities, after brushing the nose, sneezing or coughing, before preparing meals and before eating and going to the toilet. Keep your hands away from your face, avoid

touching your mouth, eyes or nose with your hands. Do not share items that you touch with your mouth, such as cups or bottles, with other people. Do not share items such as dishes, towels or work materials, such as pens, with other people. What to do with signs of illness? The first signs of infection with the novel coronavirus are cough, cold, throat scratching and fever. Some suffer from diarrhea. If, within 14 days, education workers or children and adolescents who have been in an area where cases of the novel coronavirus have already occurred show the signs of the disease described above, they should avoid unnecessary contact with other persons and, if possible, stay at home. Affected persons should contact their GP by phone and discuss the next steps before going to the practice. In case of contact with a person with such a disease, the persons concerned should contact their competent health authority. The competent health office can be determined via a database of the Robert Koch Institute (RKI) under <https://tools.rki.de/PLZTool/>. This and other information can also be found at www.infektionsschutz.de. You can also use the BZgA media, e.g. the sticker “Wash your hands right” and the poster “10 hygiene tips“, available for free download under <http://www.infektionsschutz.de/medien/plakat-10-hygienetipps>.

For Travelers

The German Federal Foreign Office recommends ¹⁷⁷ : The numerous tightening of entry and exit rules worldwide have led to a significant reduction or cessation of air traffic in many countries. The Federal Government wants to allow all German tourists who are stranded abroad to return to Germany. To this end, the Federal Government has allocated up to EUR 50 million, which is intended for return from countries where there are no other return options. More information can be found here.

Worldwide travel, warning for unnecessary tourist trips. No necessary tourist travel abroad will be warned until at least the end of April 2020, as with severe and increasing drastic restrictions on international air and travel, and global entry restrictions, quarantine measures and the restriction of public life in many countries. The risk that you will not be able to return due to the increasing restrictions is currently high in many destinations.

The Federal Ministry informs on its website about the temporary border controls introduced at the internal borders with Austria, Switzerland, France, Luxembourg and Denmark.

Some countries have imposed entry bans or special controls on certain categories of persons or flights from certain regions. This also affects travellers from Germany. Travel should therefore inform

yourself at the embassy or consulate of your country of travel in Germany before travelling.

Non-necessary tourist travel abroad will be warned until at least the end of April 2020, as with severe and increasing drastic restrictions on international air and travel, and global entry restrictions, quarantine measures and the restriction of public life in many countries. The risk that you will not be able to return due to the increasing restrictions is currently high in many destinations.

Changes to entry and quarantine regulations will be made in part without prior notice and with immediate effect. Many travellers are currently affected in several countries and are prevented from travelling on or on.

By its very nature, hazards vary according to the spread of COVID-19 in individual countries or areas, but also depending on the possibility of protective measures and distance to other people.

The increased immigration controls and health checks also affect cruise ships in particular. There have already been several refusals at ports. Delays, route changes and, in some cases, quarantine measures by local authorities are still to be expected.

Air and ship passengers from China, Japan, South Korea, Iran and Italy, as well as rail and bus passengers from there, must expect checks and fill in a disembarkation card when (re)entering Germany. This is used to track contact persons if a fellow passenger later turns out to be the carrier of the Covid-19. Border controls are again being carried out at land borders, with travellers being rejected for no good reason. Many smaller border crossings with Austria are closed.

The movement of goods, commuters, but also travellers to return to their place of residence can continue to travel, provided that they do not show symptoms of illness.

In the event of indications of a COVID-19 illness in cross-border traffic to Germany, the Federal Police will immediately consult the local health authorities. They carry out the medical assessment on a case-by-case basis and decide on possible treatment.

- Do not currently undertake tourist trips abroad.

As a tourist, use existing flights immediately for a return trip to Germany as soon as possible, as long as there are still commercial flight or land connections from your country of residence.

- Contact your tour operator as a package holidaymaker.

If there is no way to return from your country of residence, register in our return program. Further information can be found in our FAQ on the return campaign. Check your travel health insurance coverage and expand it if necessary. your insurance cover for a return.

For necessary travel before travelling, check with the representation of your destination for current entry and possible quarantine regulations and entry bans

for certain previous stays.

Make sure that there is a sufficient supply of necessary medications even in case of an extended stay abroad.

Prepare for any additional costs for extended stays and, if necessary, leave Increase your credit limit.

Do not expect a return by your tour operator or the federal government for the quarantine measures ordered, but follow the orders of local health authorities.

Observe the information in the COVID-19 leaflet as well as on the pages of the WHO ¹⁷⁸ , the RKI ¹⁷⁹ and the BZgA ¹⁸⁰ .

Check with the RKI before returning from a risk area and refer to the detailed information on travel restrictions and border controls of the BMI.

Also note the detailed information of the Federal Ministry of Health of the Federal Government on coronavirus in Germany.

Pay attention to clues and always follow the instructions of local authorities.

An overview of current case numbers for individual countries is provided by the Johns Hopkins CSSE ¹⁸¹ .

National Center for Immunization and Respiratory Diseases (NCIRD) ,
Division of Viral Diseases recommends ¹⁸² :

Help prevent the spread of respiratory diseases like COVID-19.

Avoid close contact with people who are sick.



Cover your cough or sneeze with a tissue, then throw the tissue in the trash.



Avoid touching your eyes, nose, and mouth.



Clean and disinfect frequently touched objects and surfaces.



Stay home when you are sick, except to get medical care.



Wash your hands often with soap and water for at least 20 seconds.



For more information: www.cdc.gov/COVID19

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Poster of the United States Department of Health and Human Services 183

How to Protect Yourself

Know How it Spreads



- There is currently no vaccine to prevent coronavirus disease 2019 (COVID-19).
- **The best way to prevent illness is to avoid being exposed to this virus.**
- The virus is thought to spread mainly from person-to-person.
 - Between people who are in close contact with one another (within about 6 feet).
 - Through respiratory droplets produced when an infected person coughs or sneezes.
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

Take steps to protect yourself



Clean your hands often

- **Wash your hands** often with soap and water for at least 20 seconds especially after you have been in a public place, or after blowing your nose, coughing, or sneezing.
- If soap and water are not readily available, **use a hand sanitizer that contains at least 60% alcohol** . Cover all surfaces of your hands and rub them together until they feel dry.
- **Avoid touching your eyes, nose, and mouth** with unwashed hands.



Avoid close contact

- **Avoid close contact** with people who are sick
- Put **distance between yourself and other people** if COVID-19 is spreading in your community. This is especially important for people who are at higher risk of getting very sick.

Take steps to protect others



Stay home if you're sick

- **Stay home** if you are sick, except to get medical care. Learn what to do if you are sick.



Cover coughs and sneezes

- **Cover your mouth and nose** with a tissue when you cough or sneeze or use the inside of your elbow.
- **Throw used tissues** in the trash.
- Immediately **wash your hands** with soap and water for at least 20 seconds. If soap and water are not readily available, clean your hands with a hand sanitizer that contains at least 60% alcohol.



Wear a facemask if you are sick

- **If you are sick:** You should wear a facemask when you are around other people (e.g., sharing a room or vehicle) and before you enter a healthcare provider's office. If you are not able to wear a facemask (for example, because it causes trouble breathing), then you should do your best to cover your coughs and sneezes, and people who are caring for you should wear a facemask if they enter your room. Learn what to do if you are sick.
- **If you are NOT sick:** You do not need to wear a facemask unless you are caring for someone who is sick (and they are not able to wear a facemask). Facemasks may be in short supply and they should be saved for caregivers.



Clean and disinfect

- **Clean AND disinfect frequently touched surfaces daily**. This includes tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, and sinks.
- **If surfaces are dirty, clean them:** Use detergent or soap and water prior to disinfection.

Protect Your Family

Pregnant Women. What is the risk to pregnant women of getting COVID-19? Is it easier for pregnant women to become ill with the disease? If they become infected, will they be more sick than other

people? We do not currently know if pregnant women have a greater chance of getting sick from COVID-19 than the general public nor whether they are more likely to have serious illness as a result. Pregnant women experience changes in their bodies that may increase their risk of some infections. With viruses from the same family as COVID-19, and other viral respiratory infections, such as influenza, women have had a higher risk of developing severe illness. It is always important for pregnant women to protect themselves from illnesses.

How can pregnant women protect themselves from getting COVID-19? Pregnant women should do the same things as the general public to avoid infection. You can help stop the spread of COVID-19 by taking these actions:

- Cover your cough (using your elbow is a good technique)

- Avoid people who are sick

- Clean your hands often using soap and water or alcohol-based hand sanitizer

Can COVID-19 cause problems for a pregnancy? We do not know at this time if COVID-19 would cause problems during pregnancy or affect the health of the baby after birth.

During Pregnancy or Delivery. Can COVID-19 be passed from a pregnant woman to the fetus or newborn? We still do not know if a pregnant woman with COVID-19 can pass the virus that causes COVID-19 to her fetus or baby during pregnancy or delivery. No infants born to mothers with COVID-19 have tested positive for the COVID-19 virus. In these cases, which are a small number, the virus was not found in samples of amniotic fluid or breastmilk.

Infants. If a pregnant woman has COVID-19 during pregnancy, will it hurt the baby? We do not know at this time what if any risk is posed to infants of a pregnant woman who has COVID-19. There have been a small number of reported problems with pregnancy or delivery (e.g. preterm birth) in babies born to mothers who tested positive for COVID-19 during their pregnancy. However, it is not clear that these outcomes were related to maternal infection.

Breastfeeding. Interim Guidance on Breastfeeding for a Mother Confirmed or Under Investigation For COVID-19. This interim guidance is intended for women who are confirmed to have COVID-19 or are persons-under-investigation (PUI) for COVID-19 and are currently breastfeeding. This interim guidance is based on what is currently known about COVID-19 and the transmission of other viral respiratory infections. CDC will update this interim guidance as needed as additional information becomes available. For breastfeeding guidance in the immediate postpartum setting, refer to Interim Considerations for Infection Prevention and Control of 2019 Coronavirus Disease 2019

(COVID-19) in Inpatient Obstetric Healthcare Settings.

Transmission of COVID-19 through breast milk. Much is unknown about how COVID-19 is spread. Person-to-person spread is thought to occur mainly via respiratory droplets produced when an infected person coughs or sneezes, similar to how influenza (flu) and other respiratory pathogens spread. In limited studies on women with COVID-19 and another coronavirus infection, Severe Acute Respiratory Syndrome (SARS-CoV), the virus has not been detected in breast milk; however we do not know whether mothers with COVID-19 can transmit the virus via breast milk. CDC breastfeeding guidance for other infectious illnesses

Breast milk provides protection against many illnesses. There are rare exceptions when breastfeeding or feeding expressed breast milk is not recommended. CDC has no specific guidance for breastfeeding during infection with similar viruses like SARS-CoV or Middle Eastern Respiratory Syndrome (MERS-CoV).

Outside of the immediate postpartum setting, CDC recommends that a mother with flu continue breastfeeding or feeding expressed breast milk to her infant while taking precautions to avoid spreading the virus to her infant.

Guidance on breastfeeding for mothers with confirmed COVID-19 or under investigation for COVID-19. Breast milk is the best source of nutrition for most infants. However, much is unknown about COVID-19. Whether and how to start or continue breastfeeding should be determined by the mother in coordination with her family and healthcare providers. A mother with confirmed COVID-19 or who is a symptomatic PUI should take all possible precautions to avoid spreading the virus to her infant, including washing her hands before touching the infant and wearing a face mask, if possible, while feeding at the breast. If expressing breast milk with a manual or electric breast pump, the mother should wash her hands before touching any pump or bottle parts and follow recommendations for proper pump cleaning after each use. If possible, consider having someone who is well feed the expressed breast milk to the infant.

Animals

Coronaviruses are a large family of viruses. Some coronaviruses cause cold-like illnesses in people, while others cause illness in certain types of animals, such as cattle, camels, and bats. Some coronaviruses, such as canine and feline coronaviruses, only infect animals and do not infect humans.

Risk to people. The U.S. Centers for Disease Control and Prevention (CDC), the U. S. Department of Agriculture (USDA), and

the U.S. Fish and Wildlife Service (FWS) play distinct but complementary roles in regulating the importation of live animals and animal products into the United States. CDC regulates animals and animal products that pose a threat to human health; USDA regulates animals and animal products that pose a threat to agriculture; and FWS regulates importation of endangered species and wildlife that can harm the health and welfare of humans, the interests of agriculture, horticulture, or forestry, and the welfare and survival of wildlife resources.

Some coronaviruses that infect animals have become able to infect humans and then spread between people, but this is rare. Severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) are examples of diseases caused by coronaviruses that originated in animals and spread to people. This is what is suspected to have happened with the virus that caused the current outbreak of COVID-19. However, we do not know the exact source of this virus. Public health officials and partners are working hard to identify the source of COVID-19. The first infections were linked to a live animal market, but the virus is now spreading from person to person. The coronavirus most similar to the virus causing COVID-19 is the one that causes SARS.

Coronaviruses are a large family of viruses. Some cause illness in people and others cause illness in certain types of animals.

Coronaviruses that infect animals can become able to infect people, but this is rare.

We do not know the exact source of the current outbreak of coronavirus disease 2019 (COVID-19).

We do not have evidence that companion animals, including pets, can spread COVID-19.

We do not have evidence to suggest that imported animals or animal products imported pose a risk for spreading the 2019 novel coronavirus in the United States.

At this time, there is no evidence that companion animals, including pets, can spread COVID-19 or that they might be a source of infection in the United States.

Risk from imported animals and animal products. CDC does not have evidence to suggest that imported animals or animal products pose a risk for spreading COVID-19 in the United States.

How to stay healthy around animals. In the United States, there is no evidence to suggest that any animals, including pets, livestock, or wildlife, might be a source of COVID-19 infection at this time. However, because all animals can carry germs that can make people sick, it's always a good idea to practice healthy habits around pets and other animals. Wash your hands after handling animals, their food, waste, or supplies. Practice good pet hygiene and clean up after

pets properly. Take pets to the veterinarian regularly and talk to your veterinarian if you have questions about your pet's health.

Risk to pets . CDC has not received any reports of pets or other animals becoming sick with COVID-19. Further studies are needed to understand if and how different animals could be affected by COVID-19.

How to protect pets if you are sick. If you are sick with COVID-19 (either suspected or confirmed), you should restrict contact with pets and other animals, just like you would around other people. Although there have not been reports of pets or other animals becoming sick with COVID-19, it is still recommended that people sick with COVID-19 limit contact with animals until more information is known about the virus. This can help ensure both you and your animals stay healthy. When possible, have another member of your household care for your animals while you are sick. Avoid contact with your pet including, petting, snuggling, being kissed or licked, and sharing food. If you must care for your pet or be around animals while you are sick, wash your hands before and after you interact with them. For more information visit: [What to Do if You are Sick](#).

Get Ready for COVID-19



Take actions to reduce your risk of getting sick

If you are at higher risk for serious illness from COVID-19 because of your age or because you have a serious long-term health problem, it is

extra important for you to take actions to reduce your risk of getting sick with the disease.

- Stock up on supplies.
- **Take everyday precautions** to keep space between yourself and others.
- When you go out in public, keep away from others who are sick, limit close contact and wash your hands often.
- **Avoid crowds** as much as possible.
- **Avoid cruise travel** and non-essential air travel.
- **During a COVID-19 outbreak in your community, stay home** as much as possible to further reduce your risk of being exposed.



Have supplies on hand

- **Contact your healthcare provider to ask about obtaining extra necessary medications** to have on hand in case there is an outbreak of COVID-19 in your community and you need to stay home for a prolonged period of time.
- If you cannot get extra medications, consider using mail-order for medications.
- **Be sure you have over-the-counter medicines and**

medical supplies (tissues, etc.) to treat fever and other symptoms. Most people will be able to recover from COVID-19 at home.

- **Have enough household items and groceries** on hand so that you will be prepared to stay at home for a period of time.



Take everyday precautions

Avoid close contact with people who are sick.

Take everyday preventive actions:

- Clean your hands often
- **Wash your hands often** with soap and water for at least 20 seconds, especially after blowing your nose, coughing, or sneezing, or having been in a public place.
- If soap and water are not available, use a hand sanitizer that contains at least 60% alcohol.
- **To the extent possible, avoid touching high-touch surfaces in public places** – elevator buttons, door handles, handrails, handshaking with people, etc. Use a tissue or your sleeve to cover your hand or finger if you must touch something.
- Wash your hands after touching surfaces in public places.
- **Avoid touching your face**, nose, eyes, etc.
- **Clean and disinfect** your home to remove germs: practice routine cleaning of frequently touched surfaces (for example: tables, doorknobs, light switches, handles, desks, toilets, faucets, sinks & cell phones)
- **Avoid crowds**, especially in poorly ventilated spaces. Your risk of exposure to respiratory viruses like COVID-19 may increase in crowded, closed-in settings

with little air circulation if there are people in the crowd who are sick.

- **Avoid all non-essential travel** including plane trips, and especially avoid embarking on cruise ships.



If COVID-19 is spreading in your community

Take extra measures to put distance between yourself and other people to further reduce your risk of being exposed to this new virus.

- **Stay home** as much as possible.
- **Consider ways of getting food brought to your house** through family, social, or commercial networks

If a COVID-19 outbreak happens in your community, it could last for a long time. (An outbreak is when a large number of people suddenly get sick.) Depending on how severe the outbreak is, public health officials may recommend community actions to reduce people's risk of being exposed to COVID-19. These actions can slow the spread and reduce the impact of disease.



Have a plan for if you get sick

- **Consult with your health care provider** for more information about monitoring your health for symptoms suggestive of COVID-19.
- **Stay in touch with others by phone or email.** You may need to ask for help from friends, family, neighbors, community health workers, etc. if you become sick.
- **Determine who can care for you** if your caregiver gets sick.

Disinfecting your home if someone is sick



Clean

- **Clean surfaces using soap and water.** Practice routine cleaning of frequently touched surfaces.

High touch surfaces include: Tables, doorknobs, light switches, countertops, handles, desks, phones, keyboards, toilets, faucets, sinks, etc.



Disinfect

- **Use diluted household bleach solutions** if appropriate for the surface. Check to ensure the product is not past its expiration date. Unexpired household bleach will be effective against coronaviruses when properly diluted.

Follow manufacturer's instructions for application and proper ventilation. Never mix household bleach with ammonia or any other cleanser.

To make a bleach solution , mix:

- 5 tablespoons (1/3rd cup) bleach per gallon of water

OR

- 4 teaspoons bleach per quart of water

- **Alcohol solutions with at least 70% alcohol.**
- **Household cleaners and disinfectants:** Clean the area or item with soap and water or another detergent if it is dirty. Then, use a household disinfectant.

Follow the instructions on the label to ensure safe and effective use of the product.

Many products recommend:

- Keeping the surface wet for several minutes to ensure germs are killed.
- Precautions such as wearing gloves and making sure you have good ventilation during use of the product.



Soft surfaces

For soft surfaces such as **carpeted floor, rugs, and drapes**

- **Clean the surface using soap and water** or with cleaners appropriate for use on these surfaces.
- **Launder items** (if possible) according to the manufacturer's instructions. Use the warmest appropriate water setting and dry items completely.

OR

- **Disinfect with an EPA-registered household disinfectant.** These disinfectants  meet EPA's criteria for use against COVID-19.



Laundry

For clothing, towels, linens and other items

- **Wear disposable gloves.**
- **Wash hands with soap and water** as soon as you remove the gloves.
- **Do not shake** dirty laundry.
- Launder items according to the manufacturer's instructions. Use the **warmest appropriate water setting** and dry items completely.
- Dirty laundry from an ill person **can be washed with other people's items**.
- Clean and **disinfect clothes hampers** according to guidance above for surfaces.



Clean hands often

- **Wash your hands often** with soap and water for 20 seconds.
 - Always wash immediately after removing gloves and after contact with an ill person.
- **Hand sanitizer:** If soap and water are not readily available and hands are not visibly dirty, use a hand sanitizer that contains at least 60% alcohol. However, if hands are visibly dirty, always wash hands with soap and water.
- **Additional key times to clean hands** include:
 - After blowing one's nose, coughing, or sneezing
 - After using the restroom
 - Before eating or preparing food
 - After contact with animals or pets
 - Before and after providing routine care for another person who needs assistance (e.g. a child)
- **Avoid touching** your eyes, nose, and mouth with unwashed hands.



Food

- **Stay separated:** The ill person should eat (or be fed) in their room if possible.
- **Wash dishes and utensils using gloves and hot water:** Handle any non-disposable used food service items with gloves and wash with hot water or in a dishwasher.

Clean hands after handling used food service items.



Trash

- **Dedicated, lined trash can:** If possible, dedicate a lined trash can for the ill person. Use gloves when removing garbage bags, and handling and disposing of trash. Wash hands afterwards.

What to do if You are Sick

Call your doctor: If you think you have been exposed to COVID-19 and develop a fever and symptoms, such as cough or difficulty breathing, call your healthcare provider for medical advice. Steps to help prevent the spread of COVID-19 if you are sick

Follow the steps below: If you are sick with COVID-19 or think you might have it, follow the steps below to help protect other people in your home and community.



Stay home except to get medical care

- **Stay home:** People who are mildly ill with COVID-19 are able to recover at home. Do not leave, except to get medical care. Do not visit public areas.
- **Stay in touch with your doctor** . Call before you get medical care. Be sure to get care if you feel worse or you think it is an emergency.
- **Avoid public transportation:** Avoid using public transportation, ride-sharing, or taxis.



Separate yourself from other people in your home, this is known as home isolation

- **Stay away from others:** As much as possible, you should stay in a specific “sick room” and away from other people in your home. Use a separate bathroom, if available.
- **Limit contact with pets & animals:** You should restrict contact with pets and other animals, just like you would around other people.
 - Although there have not been reports of pets or other animals becoming sick with COVID-19, it is still recommended that people with the virus limit contact with animals until more information is known.
 - When possible, have another member of your household care for your animals while you are sick with COVID-19. If you must care for your pet or be around animals while you are sick, wash your hands before and after you interact with them

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If someone in your home is sick



Call ahead before visiting your doctor

- **Call ahead:** If you have a medical appointment, call your doctor's office or emergency department, and tell them you have or may have COVID-19. This will help the office protect themselves and other patients.



Wear a facemask if you are sick

- **If you are sick:** You should wear a facemask when you are around other people and before you enter a healthcare provider's office.
- **If you are caring for others:** If the person who is sick is not able to wear a facemask (for example, because it causes trouble breathing), then people who live in the home should stay in a different room. When caregivers enter the room of the sick person, they should wear a facemask. Visitors, other than caregivers, are not recommended.



Cover your coughs and sneezes

- **Cover:** Cover your mouth and nose with a tissue when you cough or sneeze.
- **Dispose:** Throw used tissues in a lined trash can.
- **Wash hands:** Immediately wash your hands with soap and water for at least 20 seconds. If soap and water are not available, clean your hands with an alcohol-based hand sanitizer that contains at least 60% alcohol.



Clean your hands often

- **Wash hands:** Wash your hands often with soap and water for at least 20 seconds. This is especially important after blowing your nose, coughing, or sneezing; going to the bathroom; and before eating or preparing food.
- **Hand sanitizer:** If soap and water are not available, use an alcohol-based hand sanitizer with at least 60% alcohol, covering all surfaces of your hands and rubbing them together until they feel dry.
- **Soap and water:** Soap and water are the best option, especially if hands are visibly dirty.
- **Avoid touching:** Avoid touching your eyes, nose, and mouth with unwashed hands.



Avoid sharing personal household items

- **Do not share:** Do not share dishes, drinking glasses, cups, eating utensils, towels, or bedding with other people in your home.
- **Wash thoroughly after use:** After using these items, wash them thoroughly with soap and water or put in the dishwasher.



Clean all “high-touch” surfaces everyday

Clean high-touch surfaces in your isolation area (“sick room” and bathroom) every day; let a caregiver clean and disinfect high-touch surfaces in other areas of the home.

- **Clean and disinfect:** Routinely clean high-touch surfaces in your “sick room” and bathroom. Let someone else clean and disinfect surfaces in common areas, but not your bedroom and bathroom.
 - If a caregiver or other person needs to clean and disinfect a sick person’s bedroom or bathroom, they should do so on an as-needed basis. The caregiver/other person should wear a mask and wait as long as possible after the sick person has used the bathroom.

High-touch surfaces include phones, remote controls, counters, tabletops, doorknobs, bathroom fixtures, toilets, keyboards, tablets, and bedside tables.

- **Clean and disinfect areas that may have blood, stool, or body fluids on them .**

- **Household cleaners and disinfectants:** Clean the area or item with soap and water or another detergent if it is dirty. Then, use a household disinfectant.
 - Be sure to follow the instructions on the label to ensure safe and effective use of the product. Many products recommend keeping the surface wet for several minutes to ensure germs are killed. Many also recommend precautions such as wearing gloves and making sure you have good ventilation during use of the product.
 - Most EPA-registered household disinfectants should be effective.



Monitor your symptoms

- **Seek medical attention, but call first:** Seek medical care right away if your illness is worsening (for example, if you have difficulty breathing).
 - **Call your doctor before going in:** Before going to the doctor's office or emergency room, call ahead and tell them your symptoms. They will tell you what to do.
- **Wear a facemask:** If possible, put on a facemask before you enter the building. If you can't put on a facemask, try to keep a safe distance from other people (at least 6 feet away). This will help protect the people in the office or waiting room.

- **Follow care instructions from your healthcare provider and local health department:** Your local health authorities will give instructions on checking your symptoms and reporting information.

If you develop **emergency warning signs** for COVID-19 get **medical attention immediately** . Emergency warning signs include (This list is not all inclusive. Please consult your medical provider for any other symptoms that are severe or concerning):

- Difficulty breathing or shortness of breath
- Persistent pain or pressure in the chest
- New confusion or inability to arouse
- Bluish lips or face

Call 911 ¹⁸⁴ if you have a medical emergency: If you have a medical emergency and need to call 911, notify the operator that you have or think you might have, COVID-19. If possible, put on a facemask before medical help arrives.



How to discontinue home isolation

- People **with COVID-19 who have stayed home (home isolated)** can stop home isolation under the following conditions:
 - ***If you will not have a test*** to determine if you are still contagious, you can leave home after these three things have happened:
 - You have had no fever for at least 72 hours (that is three full days of no fever without the use medicine that reduces fevers) AND
 - other symptoms have improved (for example, when your cough or shortness of breath have improved) AND
 - at least 7 days have passed since your symptoms first appeared
 - ***If you will be tested*** to determine if you are still contagious, you can leave home after these three things have happened:
 - You no longer have a fever (without the use medicine that reduces fevers) AND
 - other symptoms have improved (for example, when your cough or shortness of breath have improved) AND you received two negative tests in a row, 24 hours apart. Your doctor will follow CDC guidelines.

In all cases, **follow the guidance of your healthcare provider and local health department.** The decision to stop home isolation should be made in consultation with your healthcare provider and state and local health departments. Local decisions depend on local circumstances.

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Preventing the Spread of Coronavirus Disease 2019 in Homes and Residential Communities 185

Recommended precautions for household members, intimate partners, and caregivers in a nonhealthcare setting¹ of A patient with symptomatic laboratory-confirmed COVID-19 OR A patient under investigation

Household members, intimate partners, and caregivers in a nonhealthcare setting may have close contact² with a person with symptomatic, laboratory-confirmed COVID-19 or a person under investigation. Close contacts should monitor their health; they should call their healthcare provider right away if they develop symptoms suggestive of COVID-19 (e.g., fever, cough, shortness of breath) (see Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 (COVID-19) Exposure in Travel-associated or Community Settings.); close contacts should also follow these recommendations:

- Make sure that you understand and can help the patient follow their healthcare provider's instructions for medication(s) and care. You should help the patient with basic needs in the home and provide support for getting groceries, prescriptions, and other personal needs.
- Monitor the patient's symptoms. If the patient is getting sicker, call his or her healthcare provider and tell them that the patient has laboratory-confirmed COVID-19. This will help the healthcare provider's office take steps to keep other people in the office or waiting room from getting infected. Ask the healthcare provider to call the local or state health department for additional guidance. If the patient has a medical emergency and you need to call 911, notify the dispatch personnel that the patient has, or is being evaluated for COVID-19.
- Household members should stay in another room or be separated from the patient as much as possible. Household members should use a separate bedroom and bathroom, if available.
- Prohibit visitors who do not have an essential need to be in the home.
- Household members should care for any pets in the home. Do not handle pets or other animals while sick. For more information, see COVID-19 and Animals.
- Make sure that shared spaces in the home have good air flow, such as by an air conditioner or an opened window, weather permitting.
- Perform hand hygiene frequently. Wash your hands often with soap and water for at least 20 seconds or use an alcohol-based hand sanitizer that contains 60 to 95% alcohol, covering all surfaces of your hands and rubbing them together until they feel dry. Soap and water should be used preferentially if hands are visibly dirty.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- The patient should wear a facemask when you are around other people. If the patient is not able to wear a facemask (for example, because it causes trouble breathing), you, as the caregiver, should wear a mask when you are in the same room as the patient.
- Wear a disposable facemask and gloves when you touch or have contact with the patient's blood, stool, or body fluids, such as saliva, sputum, nasal mucus, vomit, urine.
 - Throw out disposable facemasks and gloves after using them. Do not reuse.
 - When removing personal protective equipment, first remove and dispose of gloves. Then, immediately clean your hands with soap and water or alcohol-based hand sanitizer. Next, remove and dispose of facemask, and immediately clean your hands again with soap and water or alcohol-based hand sanitizer.
- Avoid sharing household items with the patient. You should not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items. After the patient uses these items, you should wash them thoroughly (see below "Wash laundry thoroughly").
- Clean all "high-touch" surfaces, such as counters, tabletops, doorknobs, bathroom fixtures, toilets, phones, keyboards, tablets, and bedside tables, every day. Also, clean any surfaces that may have blood, stool, or body fluids on them.
 - Use a household cleaning spray or wipe, according to the label

instructions. Labels contain instructions for safe and effective use of the cleaning product including precautions you should take when applying the product, such as wearing gloves and making sure you have good ventilation during use of the product.

- Wash laundry thoroughly.
 - Immediately remove and wash clothes or bedding that have blood, stool, or body fluids on them.
 - Wear disposable gloves while handling soiled items and keep soiled items away from your body. Clean your hands (with soap and water or an alcohol-based hand sanitizer) immediately after removing your gloves.
 - Read and follow directions on labels of laundry or clothing items and detergent. In general, using a normal laundry detergent according to washing machine instructions and dry thoroughly using the warmest temperatures recommended on the clothing label.
- Place all used disposable gloves, facemasks, and other contaminated items in a lined container before disposing of them with other household waste. Clean your hands (with soap and water or an alcohol-based hand sanitizer) immediately after handling these items. Soap and water should be used preferentially if hands are visibly dirty.
- Discuss any additional questions with your state or local health department or healthcare provider. Check available hours when contacting your local health department.

Footnotes

Home healthcare personnel should refer to Interim Infection Prevention and Control Recommendations for Patients with Known or Patients Under Investigation for Coronavirus Disease 2019 (COVID-19) in a Healthcare Setting.

² Close contact is defined as — a) being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time; close contact can occur while caring for, living with, visiting, or sharing a health care waiting area or room with a COVID-19 case — or — b) having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on).

Interim US Guidance for Risk Assessment and Public Health Management of Persons with Potential Coronavirus Disease 2019 (COVID-19) Exposures: Geographic Risk and Contacts of Laboratory-confirmed Cases **186**

[...]

Background. CDC is closely monitoring an epidemic of respiratory illness (COVID-19) caused by a novel (new) coronavirus (SARS-CoV-2) that was first detected in Wuhan, Hubei Province, China. Chinese health officials have reported tens of thousands of illnesses with COVID-19 in China and the virus is spreading from person-to-person in many parts of that country. Cases of COVID-19 are also being reported in a growing number of international locations, several

of which are experiencing sustained community-level or widespread person-to-person transmission. Cases of COVID-19 without direct links to travel have been reported in the United States and sustained transmission is occurring in some US communities.

Purpose. The purpose of this interim guidance is to provide public health authorities and other partners in US jurisdictions that are not experiencing sustained community transmission of COVID-19 with a framework for assessing and managing risk of potential exposures to SARS-CoV-2 and implementing public health actions based on a person's risk level and clinical presentation. Public health actions may include monitoring or the application of movement restrictions, including isolation and quarantine, when needed to delay the introduction and spread of SARS-CoV-2 in these communities. The recommendations in this guidance apply to US-bound travelers who may have been exposed to SARS-CoV-2 and people identified through contact investigations of laboratory-confirmed cases. CDC acknowledges that state and local jurisdictions may make risk management decisions that differ from those recommended here. Public health management decisions should be based on the situation in the jurisdiction and the priorities of public health authorities. The guidance will be updated based on the evolving circumstances of the epidemic.

Rationale. The guidance was designed for a "containment" approach in the absence of sustained SARS-CoV-2 transmission in US communities in order to delay introduction and spread of SARS-CoV-2. It focuses on decreasing the risk of unrecognized case importation from international locations with sustained transmission and managing contacts of laboratory-confirmed cases. In US jurisdictions that are not experiencing sustained community transmission, these activities are still important; however, a resource-intensive containment approach that focuses on international travelers poses a risk of diverting public health resources from other priority activities, including surveillance and case finding, contact tracing, and preparing for community mitigation measures. Allowing health departments the flexibility to prioritize public health actions in their jurisdictions enables prudent deployment of public health resources where they can have the most benefit based on the local situation. State and local health departments are best positioned to make such decisions within their jurisdictions.

In US jurisdictions with sustained community transmission, shifting from containment to mitigation conserves public health resources and directs them to where they can have the most benefit. In such jurisdictions, residents may have the same exposure risk as international travelers from countries with sustained transmission; therefore, applying stringent containment measures to international

travelers (e.g., staying home for 14 days) no longer has a public health benefit and would be arbitrary in the context of similar risk among others in the community. Applying such containment measures (e.g., asking people to stay home) community-wide would have severe detrimental effects on community infrastructure. When SARS-CoV-2 is spreading in a community, it is also not feasible to identify all people with symptoms compatible with COVID-19 or identify all potentially exposed contacts. Applying stringent containment measures to people who are tested and have laboratory confirmation and their contacts, but not to others who are not tested and their contacts, would have no public health benefit. Such an approach could hamper surveillance efforts and ability of public health authorities to make data-driven decisions for the implementation of community mitigation measures. Separate CDC guidance is in development that harmonizes recommendations for people who are tested and confirmed positive for COVID-19 and others in the community who are symptomatic but not tested, as well as their contacts. Definitions Used in this Guidance:

Symptoms compatible with COVID-19, for the purpose of these recommendations, include subjective or measured fever, cough, or difficulty breathing.

Self-observation means people should remain alert for subjective fever, cough, or difficulty breathing. If they feel feverish or develop cough or difficulty breathing during the self-observation period, they should take their temperature, self-isolate, limit contact with others, and seek advice by telephone from a healthcare provider or their local health department to determine whether medical evaluation is needed.

Self-monitoring means people should monitor themselves for fever by taking their temperatures twice a day and remain alert for cough or difficulty breathing. If they feel feverish or develop measured fever, cough, or difficulty breathing during the self-monitoring period, they should self-isolate, limit contact with others, and seek advice by telephone from a healthcare provider or their local health department to determine whether medical evaluation is needed.

Self-monitoring with delegated supervision means, for certain occupational groups (e.g., some healthcare or laboratory personnel, airline crew members), self-monitoring with oversight by the appropriate occupational health or infection control program in coordination with the health department of jurisdiction. The occupational health or infection control personnel for the employing organization should establish points of contact between the organization, the self-monitoring personnel, and the local or state health departments with jurisdiction for the location where personnel will be during the self-monitoring period. This communication should

result in agreement on a plan for medical evaluation of personnel who develop fever, cough, or difficulty breathing during the self-monitoring period. The plan should include instructions for notifying occupational health and the local public health authority, and transportation arrangements to a pre-designated hospital, if medically necessary, with advance notice if fever, cough, or difficulty breathing occur. The supervising organization should remain in contact with personnel through the self-monitoring period to oversee self-monitoring activities.

Self-monitoring with public health supervision means public health authorities assume the responsibility for oversight of self-monitoring for certain groups of people. The ability of jurisdictions to initiate or provide continued oversight will depend on other competing priorities (e.g., contact tracing, implementation of community mitigation strategies). Depending on local priorities, CDC recommends that health departments consider establishing initial communication with these people, provide a plan for self-monitoring and clear instructions for notifying the health department before the person seeks health care if they develop fever, cough, or difficulty breathing. As resources allow, health authorities may also check in intermittently with these people over the course of the self-monitoring period. If travelers for whom public health supervision is recommended are identified at a US port of entry, CDC will notify state and territorial health departments with jurisdiction for the travelers' final destinations.

Active monitoring means that the state or local public health authority assumes responsibility for establishing regular communication with potentially exposed people to assess for the presence of fever, cough, or difficulty breathing. For people with high-risk exposures, CDC recommends this communication occurs at least once each day . The mode of communication can be determined by the state or local public health authority and may include telephone calls or any electronic or internet-based means of communication.

Close contact is defined as: a) being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time; close contact can occur while caring for, living with, visiting, or sharing a healthcare waiting area or room with a COVID-19 case – or – b) having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on)

Public health orders are legally enforceable directives issued under the authority of a relevant federal, state, or local entity that, when applied to a person or group, may place restrictions on the activities undertaken by that person or group, potentially including movement restrictions or a requirement for monitoring by a public health authority, for the purposes of protecting the public's health. Federal, state, or local public health orders may be issued to enforce

isolation, quarantine or conditional release. The list of quarantinable communicable diseases for which federal public health orders are authorized is defined by Executive Order and includes “severe acute respiratory syndromes.” COVID-19 meets the definition for “severe acute respiratory syndromes” as set forth in Executive Order 13295, as amended by Executive Order 13375 and 13674, and, therefore, is a federally quarantinable communicable disease.

Isolation means the separation of a person or group of people known or reasonably believed to be *infected with a communicable disease and potentially infectious* from those who are not infected to prevent spread of the communicable disease. Isolation for public health purposes may be voluntary or compelled by federal, state, or local public health order.

Quarantine in general means the separation of a person or group of people reasonably believed to have been *exposed to a communicable disease but not yet symptomatic*, from others who have not been so exposed, to prevent the possible spread of the communicable disease.

Conditional release defines a set of legally enforceable conditions under which a person may be released from more stringent public health movement restrictions, such as quarantine in a secure facility. These conditions may include public health supervision through in-person visits by a health official or designee, telephone, or any electronic or internet-based means of communication as determined by the CDC Director or state or local health authority. A conditional release order may also place limits on travel or require restriction of a person’s movement outside their home.

Controlled travel involves exclusion from long-distance commercial conveyances (e.g., aircraft, ship, train, bus). For people subject to active monitoring, any long-distance travel should be coordinated with public health authorities to ensure uninterrupted monitoring. Air travel is not allowed by commercial flight but may occur via approved noncommercial air transport. CDC may use public health orders or federal public health travel restrictions to enforce controlled travel. CDC also has the authority to issue travel permits to define the conditions of interstate travel within the United States for people under certain public health orders or if other conditions are met.

Congregate settings are crowded public places where close contact with others may occur, such as shopping centers, movie theaters, stadiums.

Social distancing means remaining out of congregate settings, avoiding mass gatherings, and maintaining distance (approximately 6 feet or 2 meters) from others when possible.

Exposure Risk Categories

Table 1: Risk Categories for Exposures Associated with International Travel or Identified during Contact Investigations of Laboratory-confirmed Cases

Risk Level	Geographic (Travel-associated) Exposures	Exposures Identified through Contact Investigation
High	Travel from Hubei Province, China	Living in the same household as, being an intimate partner of, or providing care in a nonhealthcare setting (such as a home) for a person with symptomatic laboratory-confirmed COVID-19 infection without using recommended precautions for home care and home isolation
Medium (assumes no exposures in the high-risk category)	Travel from mainland China outside Hubei Province or Iran Travel from a country with widespread sustained transmission, other than China or Iran Travel from a country with sustained community transmission	Close contact with a person with symptomatic laboratory-confirmed COVID-19 On an aircraft, being seated within 6 feet (two meters) of a traveler with symptomatic laboratory-confirmed COVID-19 infection; this distance correlates approximately with 2 seats in each direction Living in the same household as, an intimate partner of, or caring for a person in a nonhealthcare setting (such as a home) to a person with symptomatic laboratory-confirmed COVID-19 infection while consistently using recommended precautions for home care and home isolation
Low (assumes no exposures in the high-risk category)	Travel from any other country	Being in the same indoor environment (e.g., a classroom, a hospital waiting room) as a person with symptomatic laboratory-confirmed COVID-19 for a prolonged period of time but not meeting the definition of close contact
No identifiable risk	Not applicable	Interactions with a person with symptomatic laboratory-confirmed COVID-19 infection that do not meet any of the high-, medium- or low-risk conditions above, such as walking by the person or being briefly in the same room.

These categories are interim and subject to change.

CDC has established the following exposure risk categories to help guide public health management of people following potential SARS-CoV-2 exposure in jurisdictions that are not experiencing sustained community transmission. These categories may not cover all potential exposure scenarios. They should not replace an individual assessment of risk for the purpose of clinical decision making or individualized public health management.

All exposures apply to the 14 days prior to assessment.

For country-level risk classifications, see Coronavirus Disease 2019 Information for Travel. CDC has provided separate guidance for healthcare settings.

* In general, geographic exposure categories do not apply to travelers who only transit through an airport.

Recommendations for Exposure Risk Management. State and local authorities have primary jurisdiction for isolation and other public health orders within their respective jurisdictions. Federal public health authority primarily extends to international arrivals at ports of entry and to preventing interstate communicable disease threats.

CDC recognizes that decisions and criteria to use such public health measures may differ by jurisdiction. Consistent with principles of federalism, state and local jurisdictions may choose to make decisions about isolation, other public health orders, and monitoring that exceed those recommended in federal guidance. As the domestic COVID-19 situation evolves, public health authorities should base their decisions about application of individual-level monitoring or movement restrictions on the situation in their jurisdictions, including whether sustained community transmission is occurring and competing priorities.

The issuance of public health orders should be considered in the context of other less restrictive means that could accomplish the same public health goals. People under public health orders must be treated with respect, fairness, and compassion, and public health authorities should take steps to reduce the potential for stigma (e.g., through outreach to affected communities, public education campaigns). Considerable, thoughtful planning by public health authorities is needed to implement public health orders properly. Specifically, measures must be in place to provide shelter, food, water, and other necessities for people whose movement is restricted under public health orders, and to protect their dignity and privacy.

CDC's recommendations for public health management of international travelers with potential exposure to SARS-CoV-2 and people identified through contact investigations of laboratory-confirmed cases, including monitoring and the application of travel or movement restrictions, are summarized in Table 2. Additional recommendations in specific groups or settings are provided below.

Crews on Passenger or Cargo Flights. CDC and the Federal Aviation Administration have jointly provided interim health guidance for air carriers and crews pdf iconexternal icon . This FAA-CDC guidance includes recommendations for air crews to self-monitor under the supervision of their employer's occupational health program and to remain in their hotel rooms and practice social distancing while on overnight layovers in the United States (applies to US-based crews and crews based in other countries) or internationally (applies to US-based crews). These recommendations were made because SARS-CoV-2 is spreading in all regions internationally as well as in the United States. Also, the rapidly changing situation means country-level geographic risk assessments cannot be relied on to accurately judge

the risk to crewmembers in any given location. As long as they remain asymptomatic, crew members may continue to work on flights into, within, or departing from the United States. Crew members who follow their carrier's occupational health plan as well as the FAA-CDC guidance are not subject to restrictions applied to other travelers. If they develop fever, cough, or difficulty breathing, crew members should self-isolate and be excluded from work on commercial flights immediately, and remain excluded until cleared to work by their occupational health program and public health authorities.

Regardless of residence or travel history, crew members who have known exposure to persons with COVID-19 should be assessed and managed on a case-by-case basis.

Personnel in Critical Infrastructure Positions. Some personnel (e.g., emergency first responders) fill essential (critical) infrastructure roles within communities. Based on the needs of individual jurisdictions, and at the discretion of state or local health authorities, these personnel may be permitted to continue work following potential exposure to SARS-CoV-2 (either travel-associated or close contact to a confirmed case), provided they remain asymptomatic. Personnel who are permitted to work following an exposure should self-monitor under the supervision of their employer's occupational health program including taking their temperature before each work shift to ensure they remain afebrile. On days these individuals are scheduled to work, the employer's occupational health program could consider measuring temperature and assessing symptoms prior to their starting work. Exposed healthcare personnel who are considered part of critical infrastructure should follow existing CDC guidance.

People with Laboratory-Confirmed COVID-19 and Symptomatic People Under Investigation for COVID-19. CDC has established criteria for determining when an individual can be considered non-infectious to guide discontinuation of transmission-based precautions for hospitalized patients or home isolation. While individuals are considered infectious, local or long-distance travel should occur only by medical transport (e.g., ambulance or air medical transport) or private vehicle. Isolation and travel restrictions are removed upon determination by public health authorities that the person is no longer considered to be infectious.

Symptomatic people who meet CDC's definition of Persons Under Investigation (PUI) should be evaluated by healthcare providers in conjunction with local health authorities. PUIs awaiting results of rRT-PCR testing for COVID-19 should remain in isolation at home or in a healthcare facility until their test results are known. Depending on the clinical suspicion of COVID-19, PUIs for whom an initial rRT-PCR test is negative may be candidates for removal of any isolation and travel

restrictions specific to symptomatic people, but any restrictions for asymptomatic people according to the assigned risk level should still apply. Management decisions of PUIs who are not tested should be made on a case-by-case basis, using available epidemiologic and clinical information, in conjunction with CDC guidance.

Contacts of Asymptomatic People Exposed to COVID-19

CDC does not recommend testing, symptom monitoring or special management for people exposed to asymptomatic people with potential exposures to SARS-CoV-2 (such as in a household), i.e., “contacts of contacts;” these people are not considered exposed to SARS-CoV-2.

The public health actions recommended in the table below apply to people who have been determined to have at least some risk for COVID-19. People who are being managed as asymptomatic in a particular risk level who develop signs or symptoms compatible with COVID-19 should be moved immediately into the symptomatic category in the same risk level and be managed accordingly. The risk level does not change if symptoms develop.

Table 2. Summary of CDC Recommendations for Management of Exposed Persons with by Risk Level and Presence of Symptoms

Table 2. Summary of CDC Recommendations for Management of Exposed Persons with by Risk Level and Presence of Symptoms

Risk Level	Management if Asymptomatic	Management if Symptomatic ¹
High risk	Quarantine (voluntary or under public health orders) in a location to be determined by public health authorities. No public activities. Daily active monitoring, if possible based on local priorities Controlled travel	Immediate isolation with consideration of public health orders Public health assessment to determine the need for medical evaluation; if medical evaluation warranted, diagnostic testing should be guided by CDC's PUI definition If medical evaluation is needed, it should occur with pre-notification to the receiving HCF and EMS, if EMS transport indicated, and with all recommended infection control precautions in place. Controlled travel: Air travel only via air medical transport. Local travel is only allowed by medical transport (e.g., ambulance) or private vehicle while symptomatic person is wearing a face mask.
	Close contacts in this category: Recommendation to remain at home or in a comparable setting Practice social distancing Active monitoring as determined by local priorities Recommendation to postpone long-distance travel on commercial conveyances	Self-isolation Public health assessment to determine the need for medical evaluation; if medical evaluation warranted, diagnostic testing should be guided by CDC's PUI definition
Medium risk	Travelers from mainland China (outside Hubei Province) or Iran Recommendation to remain at home or in a comparable setting Practice social distancing Self-monitoring with public health supervision as determined by local priorities Recommendation to postpone additional long-distance travel on commercial conveyances after they reach their final destination	If medical evaluation is needed, it should ideally occur with pre-notification to the receiving HCF and EMS, if EMS transport indicated, and with all recommended infection control precautions in place. Controlled travel: Air travel only via air medical transport. Local travel is only allowed by medical transport (e.g., ambulance) or private vehicle while symptomatic person is wearing a face mask.
	Travelers from other country with widespread transmission Recommendation to remain at home or in a comparable setting.	

Risk Level	Management if Asymptomatic	Management if Symptomatic ¹
Low risk	Practice social distancing Self-monitoring Recommendation to postpone additional long-distance travel on commercial conveyances after they reach their final destination Travelers from country with sustained community transmission Practice social distancing Self-observation	Self-isolation, social distancing Person should seek health advice to determine if medical evaluation is needed. If sought, medical evaluation and care should be guided by clinical presentation; diagnostic testing for COVID-19 should be guided by CDC's PUI definition. Travel on commercial conveyances should be postponed until no longer symptomatic.
	No restriction on movement Self-observation	Self-isolation, social distancing Person should seek health advice to determine if medical evaluation is needed. If sought, medical evaluation and care should be guided by clinical presentation; diagnostic testing for COVID-19 should be guided by CDC's PUI definition. Travel on commercial conveyances should be postponed until no longer symptomatic.
No identifiable risk	None	

EMS = emergency medical services; HCF = healthcare facility; PUI = Person Under Investigation for COVID-19

¹For the purpose of this document: subjective or measured fever, cough, or difficulty breathing.

Note: The public health management recommendations made above are primarily intended for jurisdictions not experiencing sustained community transmission. In jurisdictions not experiencing sustained community transmission, CDC recommends that post-exposure public health management for asymptomatic exposed individuals continue until 14 days after the last potential exposure; however, these decisions should be made based on the local situation, available resources, and competing priorities. These factors should

also guide decisions about managing symptomatic exposed individuals.

International travelers and other potentially exposed individuals in jurisdictions experiencing sustained community transmission should follow local guidance.

For country-level risk classifications, see Coronavirus Disease 2019 Information for Travel.

CDC has provided separate guidance for healthcare settings.

Manage Anxiety & Stress ¹⁸⁷

Stress and Coping. The outbreak of coronavirus disease 2019 (COVID-19) may be stressful for people. Fear and anxiety about a disease can be overwhelming and cause strong emotions in adults and children. Coping with stress will make you, the people you care about, and your community stronger.

Everyone reacts differently to stressful situations. How you respond to the outbreak can depend on your background, the things that make you different from other people, and the community you live in.

People who may respond more strongly to the stress of a crisis include

Older people and people with chronic diseases who are at higher risk for COVID-19

- Children and teens

People who are helping with the response to COVID-19, like doctors and other health care providers, or first responders

People who have mental health conditions including problems with substance use

Stress during an infectious disease outbreak can include

Fear and worry about your own health and the health of your loved ones

- Changes in sleep or eating patterns
- Difficulty sleeping or concentrating
- Worsening of chronic health problems
- Increased use of alcohol, tobacco, or other drugs

Taking care of yourself, your friends, and your family can help you cope with stress. Helping others cope with their stress can also make your community stronger.

Things you can do to support yourself

Take breaks from watching, reading, or listening to news stories, including social media. Hearing about the pandemic repeatedly can be upsetting.

Take care of your body. Take deep breaths, stretch, or meditate. Try to eat healthy, well-balanced meals, exercise regularly, get plenty of sleep, and avoid alcohol and drugs.

Make time to unwind. Try to do some other activities you enjoy.

Connect with others. Talk with people you trust about your concerns and how you are feeling.

Call your healthcare provider if stress gets in the way of your daily activities for several days in a row.

Reduce stress in yourself and others

Sharing the facts about COVID-19 and understanding the actual risk to yourself and people you care about can make an outbreak less stressful. When you share accurate information about COVID-19 you can help make people feel less stressed and allow you to connect with them.

For parents

Children and teens react, in part, on what they see from the adults around them. When parents and caregivers deal with the COVID-19 calmly and confidently, they can provide the best support for their children. Parents can be more reassuring to others around them, especially children, if they are better prepared.

Not all children and teens respond to stress in the same way. Some common changes to watch for include

- Excessive crying or irritation in younger children
- Returning to behaviors they have outgrown (for example, toileting accidents or bedwetting)
- Excessive worry or sadness
- Unhealthy eating or sleeping habits
- Irritability and “acting out” behaviors in teens
- Poor school performance or avoiding school
- Difficulty with attention and concentration
- Avoidance of activities enjoyed in the past
- Unexplained headaches or body pain
- Use of alcohol, tobacco, or other drugs

There are many things you can do to support your child

Take time to talk with your child or teen about the COVID-19 outbreak. Answer questions and share facts about COVID-19 in a way that your child or teen can understand.

Reassure your child or teen that they are safe. Let them know it is ok if they feel upset. Share with them how you deal with your own stress so that they can learn how to cope from you.

Limit your family's exposure to news coverage of the event, including social media. Children may misinterpret what they hear and can be frightened about something they do not understand.

Try to keep up with regular routines. If schools are closed, create a schedule for learning activities and relaxing or fun activities.

Be a role model. Take breaks, get plenty of sleep, exercise, and eat well. Connect with your friends and family members.

For responders

Responding to COVID-19 can take an emotional toll on you. There are things you can do to reduce secondary traumatic stress (STS) reactions:

Acknowledge that STS can impact anyone helping families after a traumatic event.

Learn the symptoms including physical (fatigue, illness) and mental (fear, withdrawal, guilt).

Allow time for you and your family to recover from responding to the pandemic.

Create a menu of personal self-care activities that you enjoy, such as spending time with friends and family, exercising, or reading a book.

- Take a break from media coverage of COVID-19.

Ask for help if you feel overwhelmed or concerned that COVID-19 is affecting your ability to care for your family and patients as you did before the outbreak.

For people who have been released from quarantine

Being separated from others if a healthcare provider thinks you may have been exposed to COVID-19 can be stressful, even if you do not get sick. Everyone feels differently after coming out of quarantine. Some feelings include :

- Mixed emotions, including relief after quarantine

Fear and worry about your own health and the health of your loved ones

Stress from the experience of monitoring yourself or being monitored by others for signs and symptoms of COVID-19

Sadness, anger, or frustration because friends or loved ones have unfounded fears of contracting the disease from contact with you, even though you have been determined not to be contagious

Guilt about not being able to perform normal work or parenting duties during quarantine

- Other emotional or mental health changes

Children may also feel upset or have other strong emotions if they, or someone they know, has been released from quarantine. You can help your child cope.

Background. There is much to learn about the novel coronavirus that causes coronavirus disease 2019 (COVID-19). Based on what is currently known about the novel coronavirus and similar coronaviruses that cause SARS and MERS, spread from person-to-person with these viruses happens most frequently among close contacts (within about 6 feet). This type of transmission occurs via respiratory droplets. On the other hand, transmission of novel coronavirus to persons from surfaces contaminated with the virus has not been documented. Transmission of coronavirus occurs much more commonly through respiratory droplets than through fomites. Current evidence suggests that novel coronavirus may remain viable for hours to days on surfaces made from a variety of materials. Cleaning of visibly dirty surfaces followed by disinfection is a best practice measure for prevention of COVID-19 and other viral respiratory illnesses in households and community settings.

Purpose. This guidance provides recommendations on the cleaning and disinfection of households where persons under investigation (PUI) or those with confirmed COVID-19 reside or may be in self-isolation. It is aimed at limiting the survival of the virus in the environments. These recommendations will be updated if additional information becomes available.

These guidelines are focused on household settings and are meant for the general public.

Cleaning refers to the removal of germs, dirt, and impurities from surfaces. Cleaning does not kill germs, but by removing them, it lowers their numbers and the risk of spreading infection. Disinfecting refers to using chemicals to kill germs on surfaces. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface after cleaning, it can further lower the risk of spreading infection.

General Recommendations for Routine Cleaning and Disinfection of Households. Community members can practice routine cleaning of frequently touched surfaces (for example: tables, doorknobs, light switches, handles, desks, toilets, faucets, sinks) with household cleaners and EPA-registered disinfectants that are appropriate for the surface, following label instructions. Labels contain instructions for safe and effective use of the cleaning product including precautions you should take when applying the product, such as wearing gloves and making sure you have good ventilation during use of the product.

General Recommendations for Cleaning and Disinfection of Households with People Isolated in Home Care (e.g. Suspected/

Confirmed to have COVID-19).

Household members should educate themselves about COVID-19 symptoms and preventing the spread of COVID-19 in homes.

Clean and disinfect high-touch surfaces daily in household common areas (e.g. tables, hard-backed chairs, doorknobs, light switches, remotes, handles, desks, toilets, sinks). In the bedroom/bathroom dedicated for an ill person: consider reducing cleaning frequency to as-needed (e.g., soiled items and surfaces) to avoid unnecessary contact with the ill person.

- As much as possible, an ill person should stay in a specific room and away from other people in their home, following home care guidance.
- The caregiver can provide personal cleaning supplies for an ill person's room and bathroom, unless the room is occupied by child or another person for whom such supplies would not be appropriate. These supplies include tissues, paper towels, cleaners and EPA-registered disinfectants (examples at this [linkpdf iconexternal icon](#)).
- If a separate bathroom is not available, the bathroom should be cleaned and disinfected after each use by an ill person. If this is not possible, the caregiver should wait as long as practical after use by an ill person to clean and disinfect the high-touch surfaces.

Household members should follow home care guidance when interacting with persons with suspected/confirmed COVID-19 and their isolation rooms/bathrooms.

How to clean and disinfect:

Surfaces. Wear disposable gloves when cleaning and disinfecting surfaces. Gloves should be discarded after each cleaning. If reusable gloves are used, those gloves should be dedicated for cleaning and disinfection of surfaces for COVID-19 and should not be used for other purposes. Consult the manufacturer's instructions for cleaning and disinfection products used. Clean hands immediately after gloves are removed.

If surfaces are dirty, they should be cleaned using a detergent or soap and water prior to disinfection.

For disinfection, diluted household bleach solutions, alcohol solutions with at least 70% alcohol, and most common EPA-registered household disinfectants should be effective.

Diluted household bleach solutions can be used if appropriate for the surface. Follow manufacturer's instructions for application and proper ventilation. Check to ensure the product is not past its

expiration date. Never mix household bleach with ammonia or any other cleanser. Unexpired household bleach will be effective against coronaviruses when properly diluted.

Prepare a bleach solution by mixing:

5 tablespoons (1/3rd cup) bleach per gallon of water or

4 teaspoons bleach per quart of water

Products with EPA-approved emerging viral pathogens claims  are expected to be effective against COVID-19 based on data for harder to kill viruses. Follow the manufacturer's instructions for all cleaning and disinfection products (e.g., concentration, application method and contact time, etc.).

For soft (porous) surfaces such as carpeted floor, rugs, and drapes, remove visible contamination if present and clean with appropriate cleaners indicated for use on these surfaces. After cleaning: Launder items as appropriate in accordance with the manufacturer's instructions. If possible, launder items using the warmest appropriate water setting for the items and dry items completely, or

Use products with the EPA-approved emerging viral pathogens claims (examples at this link ) that are suitable for porous surfaces.

Clothing, towels, linens and other items that go in the laundry. Wear disposable gloves when handling dirty laundry from an ill person and then discard after each use. If using reusable gloves, those gloves should be dedicated for cleaning and disinfection of surfaces for COVID-19 and should not be used for other household purposes. Clean hands immediately after gloves are removed. If no gloves are used when handling dirty laundry, be sure to wash hands afterwards. If possible, do not shake dirty laundry. This will minimize the possibility of dispersing virus through the air. Launder items as appropriate in accordance with the manufacturer's instructions. If possible, launder items using the warmest appropriate water setting for the items and dry items completely. Dirty laundry from an ill person can be washed with other people's items.

Clean and disinfect clothes hampers according to guidance above for surfaces. If possible, consider placing a bag liner that is either disposable (can be thrown away) or can be laundered.

Hand hygiene and other preventive measures. Household members should clean hands often, including immediately after removing gloves and after contact with an ill person, by washing hands with soap and water for 20 seconds. If soap and water are not available and hands are not visibly dirty, an alcohol-based hand sanitizer that contains at least 60% alcohol may be used. However, if hands are visibly dirty, always wash hands with soap and water.

Household members should follow normal preventive actions while at work and home including recommended hand hygiene and avoiding touching eyes, nose, or mouth with unwashed hands. Additional key times to clean hands include:

- After blowing one's nose, coughing, or sneezing
- After using the restroom
- Before eating or preparing food
- After contact with animals or pets

Before and after providing routine care for another person who needs assistance (e.g. a child).

Other considerations. The ill person should eat/be fed in their room if possible. Non-disposable food service items used should be handled with gloves and washed with hot water or in a dishwasher. Clean hands after handling used food service items. If possible, dedicate a lined trash can for the ill person. Use gloves when removing garbage bags, handling, and disposing of trash. Wash hands after handling or disposing of trash.

Consider consulting with your local health department about trash disposal guidance if available.

The virus is thought to spread mainly from person-to-person. Between people who are in close contact with one another (within about 6 feet). Through respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

People are thought to be most contagious when they are most symptomatic (the sickest). Some spread might be possible before people show symptoms; there have been reports of this occurring with this new coronavirus, but this is not thought to be the main way the virus spreads.

It may be possible that a person can get COVID-19 by touching a surface or object that has the virus on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the main way the virus spreads.

How easily a virus spreads from person-to-person can vary. Some viruses are highly contagious (spread easily), like measles, while other viruses do not spread as easily. Another factor is whether the spread is sustained, spreading continually without stopping.

The virus that causes COVID-19 seems to be spreading easily and sustainably in the community ("community spread") in some affected geographic areas.

Diagnosis

Pulmonary clarification (CT of the thorax, X-ray of the thorax if CT is not available, exclusion of bacterial pneumonia) and cardiac clarification (ECG: AV block, arrhythmias; echocardiography) and laboratory diagnostic (blood analysis, CRP, D-dimers, antithrombin III, NT-proBNP, troponin, creatinine, liver values) are the key points. Especially in computed tomography there is a characteristic for an experienced doctor. Cardiac diagnostics are increasingly coming into focus as recent studies show that lethal courses are often associated with fulminant myocarditis. Echocardiography should therefore be performed whenever clinical evidence of cardiac involvement can be detected.

The WHO published several testing protocols.¹⁸⁹ The standard method is real-time reverse transcription polymerase chain reaction (rRT-PCR).¹⁹⁰ The test can be done on respiratory samples obtained by various methods, nasopharyngeal swab or sputum sample.¹⁹¹ Results are generally available within a few hours to two days.¹⁹² , ¹⁹³ Blood tests require two blood samples taken two weeks apart and the results have little immediate value.¹⁹⁴ Chinese scientists also were able to isolate a strain of the coronavirus and publish the genetic sequence so that laboratories across the world could independently develop polymerase chain reaction (PCR) to detect infection.¹⁹⁵ , ¹⁹⁶ , ¹⁹⁷

As of 26 February 2020, there were no antibody tests or point-of-care tests though efforts to develop them are ongoing.¹⁹⁸

Diagnostic guidelines released by Zhongnan Hospital of Wuhan University suggested methods for detecting infections based upon clinical features and epidemiological risk. These involved identifying people who had at least two of the following symptoms in addition to a history of travel to Wuhan or contact with other infected people: fever, imaging features of pneumonia, normal or reduced white blood cell count, or reduced lymphocyte count.¹⁹⁹ A study published by Tongji Hospital in Wuhan on 26 February 2020 showed that a chest CT scan for COVID-19 has greater sensitivity (98%) than the polymerase chain reaction (71%).²⁰⁰ False negative results may occur, and false positive results are likely to be rare.²⁰¹

Procedure for diagnostics

The virus is directly detectable by RT-PCR (reverse transcriptase polymerase chain reaction) in the sputum, in the tracheal secretion, in the bronchoalveolar rinsing fluid and in the nasal smear. The laboratory examination is carried out in Germany by the consiliary laboratory for coronaviruses at the Charité in Berlin, and now more than 45 laboratories in Germany are able to do so.²⁰² This study is recommended by the Robert Koch Institute according to two criteria (the case definitions were amended on 14 February 2020, on the

website of the Robert Koch Institute a flow scheme can be found for the suspicion of investigations in which cases the investigation makes sense): for individuals with non-specific general symptoms or acute respiratory symptoms, any severity and contact with a confirmed COVID-19 case up to a maximum of 14 days before the onset of the disease and / or for people with acute respiratory symptoms of any severity with or without fever and stay in high-risk areas up to a maximum of 14 days before the onset of the disease, these groups of persons are classified by the Robert Koch Institute as a well-founded suspected case. Prior to 14 February, the case definition included persons suspected of pneumonia and staying in the risk area or contact persons. The Robert Koch Institute points out that physicians should include SARS-CoV-2 or COVID-19 in their differential diagnosis if the patient has previously been in regions with individual infection clusters (these are not considered risk areas) or has been in contact with previously unconfirmed COVID-19 cases (both criteria up to a maximum of 14 days before the onset of the disease) or if they have shown symptoms of a pneumonia caused by viruses. In these cases, an outpatient diagnosis should be made in the event of respiratory infections and the patient should be classified as a contact person until the test results are available. Until indirect detection (antibody detection) is developed, the blood serum of affected persons should be kept. ²⁰³, ²⁰⁴

The reasoned suspicion case is reported to the competent health office and decided together with the competent health authority whether outpatient or inpatient care is possible, depending on the severity of the disease. In the case of a stationary briefing, the RT-PCR test is carried out. If the results are positive, the competent health authority is informed that a laboratory-confirmed COVID-19 case has now been found, and therapy is started in a hospital. Although the finding is negative, there is a persistently high suspicion of infection with the novel coronavirus, the Robert Koch Institute recommends that the diagnosis be repeated. If the result is again negative, COVID-19 infection is considered to be excluded. If the diagnostics cannot be carried out in advance, consultation with the consular laboratory must be held again. ²⁰⁵ Outpatient diagnostics are also carried out in the case of a suspected outpatient case, and if the result is positive, there is also a laboratory-confirmed COVID-19 case, which must be reported to the health department.

Chinese researchers showed that PCR testing from BAL secretion showed higher sensitivity in 205 patients than the decrease from the throat. Similarly, in a few patients, evidence in the blood could also be provided as a sign of systemic infection. The study authors recommend the exclusion of false-negative cases by aggressive

diagnosis. ²⁰⁶

Radiologists from Changsha reported from a series of cases of 167 patients about five patients in whom at the time of pneumonia, which was confirmed by computed tomography, the RT-PCR was negative for the virus and the virus was only detected after several tests during the course of the disease. ²⁰⁷

RT-PCR

The charité's (Berlin/Germany) detection method is the real-time quantitative reverse transcriptase polymerase chain reaction (abbreviated as qRT-PCR or RT-qPCR ²⁰⁸). It is based on the detection of two nucleotide sequences, called E Gene and RdRp Gene. The first gene encodes for the viral envelope (E for envelope 'shell'), the second gene for RNA-dependent RNA polymerase and other SARS-associated coronaviruses (SARS-CoV) found in bat species were used. The first version of the real-time RT-PCR assay was created before the genome sequence of SARS-CoV-2 was released. After their release, the primers were selected, which are also suitable for the detection of SARS-CoV-2. The first assay (E gene) is used as a screening because it detects several viral species of the subgenus Sarbecovirus (of the genus betacoronavirus). If this examination is positive, a confirmation assay (RdRp gene) shall be performed. If a positive result is obtained here as well, the third is a characterization assay (also RdRp Gen). The last two assays use a gene probe that is specific to SARS-CoV-2, the second assay also contains a probe that matches the nucleotide sequence of both the RNA section of the SARS-CoV and the SARS-CoV-2. ²⁰⁹

COVID-19 Test Kit

The molecular biological detection method used in the consiliar laboratory at the Charité was developed in a rapid process in collaboration with the Berlin biotechnology company TIB Molbiol, a first version was already available on 13 January 2020. Chinese scientists have willingly contributed to this, unpublished findings. Basic data came from international research networks, and the global section of the European Virus Archive (Global, EVAg) provided necessary products (SARS-CoV RNA and RNA transcripts) for the assays. ²¹⁰ Other groups of scientists have also published their developed methods. These are PCR protocols or listings of suitable primers and their substance concentration used for RT-PCR, for example from the Centers for Disease Control and Prevention (CDC) in the United States, the CDC in China, or the University of Hong Kong. They differ in which genes of the virus RNA are detected, for example the N gene (N for the nucleocapsid phosphoprotein), the ORF1ab gene (encoded

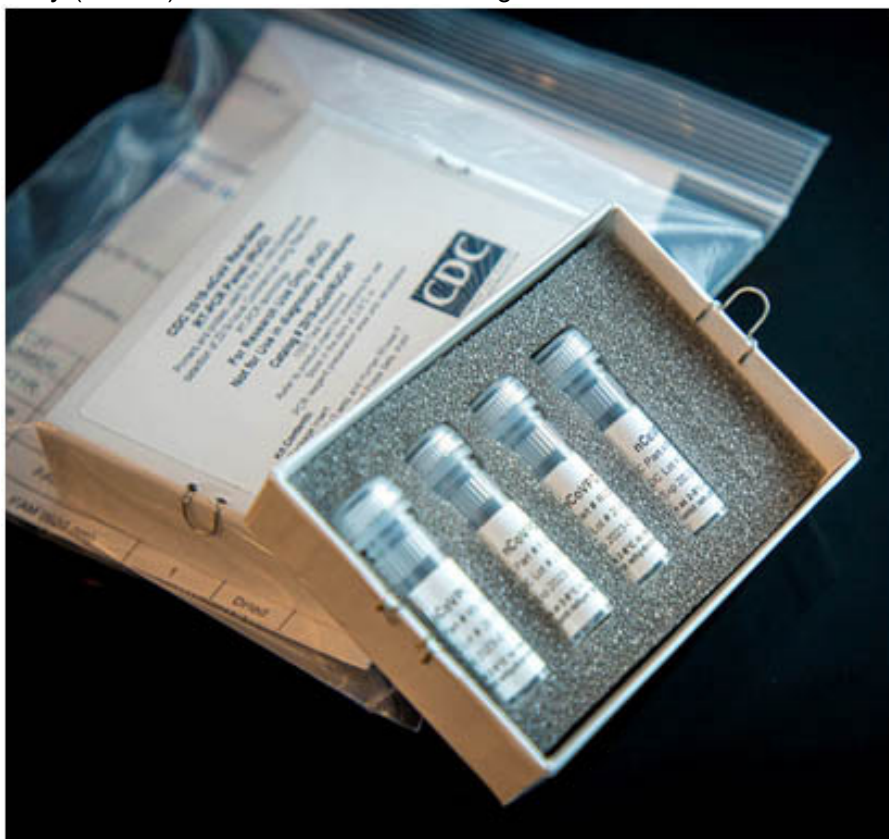
for the ORF1ab polyprotein) or the gene for the spike protein. ²¹¹ Of the detection method developed in Berlin, 40,000 test kits were sold in more than 60 countries in the first two months, for the examination of 4 million samples. ²¹² It takes 90 minutes to three hours to perform the qRT-PCR. ²¹³ Instead of the real-time quantitative variant, the products of the reverse transcriptase PCR can also be detected by means of agarose gel electrophoresis.

Genome analysis

Laboratories equipped with genome analysis (DNA sequencing of the genome) can also identify SARS-CoV-2 in this way. ²¹⁴ Complete genome analysis of SARS-CoV-2 isolates for comparison is available, for example, in the genetic database of the National Center for Biotechnology Information (NCBI) or via the GISAID platform. ²¹⁵

Nucleic acid evidence.

CDC's laboratory-proof testing system for the virus According to the World Health Organization (WHO), a simplified molecular biological process is being developed by Nucleic Acid Amplification Technology (NAAT), and the assays for it are currently being validated (as of 17 January 2020). The NAAT method is also based on the RT-PCR, but the finished assay offers the advantage of being easier to use and could be used by appropriately equipped routine laboratories. On February 5, 2020, the CDC announced that it would provide such an assay (test kit) for use in accredited diagnostic laboratories.



This is a picture of CDC's laboratory test kit for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). CDC tests are provided to U.S. state and local public health laboratories, Department of Defense (DOD) laboratories and select international laboratories. ²¹⁶

The assay is called the Centers for Disease Control and Prevention (CDC) 2019-Novel Coronavirus (2019-nCoV) Real-Time Reverse Transcriptase (RT)-PCR Diagnostic Panel and is designed to detect both the novel coronavirus and SARS-like coronavirus in samples of the upper and lower respiratory tracts of patients. Previously, the Food and Drug Administration (FDA) approved the assay as an accelerated

approval, so the assay may also be used outside research facilities.²¹⁷ A test kit allows the examination of 700–800 samples, 100 of these packages were sent to US laboratories, and another 100 to international laboratories, which carry out investigations on behalf of the WHO, for example.²¹⁸ The examination takes about four hours from the preparation of the sample to the results. The Hamburg-based company Altona Diagnostics has been offering a similar test kit for the RT-PCR since February 2020, which is also distributed worldwide.²¹⁹

Rapid test

At the end of January 2020, Xinhua, the news agency of the government of the People's Republic of China, reported that the Chinese National Medical Products Administration (NMPA) had approved four test kits of a new test procedure on January 26. The assay was developed by Changsha-based biotechnology company Sansure Biotech. With the help of the appropriate laboratory automation, test results should be available after only 30 minutes.²²⁰ ,²²¹ The state news agency also reported that a company based in Wuxi in the eastern province of Jiangsu had developed a rapid method in collaboration with the National Institute for Viral Disease Control and Prevention. The test kit is intended to detect the virus within 8–15 minutes, that the company can produce so many test kits per day that it is possible to examine 4,000 samples and the process is said to have already been used in Hubei province.²²² The Xinhua messages do not contain any reference to the molecular biological methods used. In addition, a fast-track process is being developed at China's Tianjin University in cooperation with a Beijing-based biotechnology company, with results to be available after 15 minutes. It is in trial operation (as of February 2020).²²³

Researchers at Hong Kong University of Science and Technology reported in early February 2020 that a wearable device could detect the novel coronavirus within 40 minutes. Modified chip thermocyclers are used for the faster process compared to the conventional qRT-PCR. Researchers from the Institute for Health Innovation & Technology (iHealthtech) at the National University of Singapore also reported on developing a rapid method in February 2020. It is based on technology, which has been in use since 2018 and uses nucleic acids to be detected within 30 to 60 minutes. It is estimated that it will take several months before the new test procedure is ready for market.²²⁴ The biotechnology company Qiagen N.V. also developed a rapid test at the Hilden site, which is based on a method already internationally approved for the diagnosis of pathogens, which includes SARS-associated viruses and EHEC have proof of it.²²⁵ The procedure was extended to include the detection of the genes ORF1b and E

present in the SARS CoV-2 genome and the results were compared with those of the RT-PCR method. The company is working with the WHO to achieve validation. The portable diagnostic device is suitable for use in medical practices or at airports. A smear from the throat or a blood sample is suitable as sample material, test results are available within 60 minutes. In Germany, provisional approval has been requested by the Federal Institute for Medicinal Products and Medical Devices. The diagnostic devices are currently being tested in French and Chinese hospitals (as of February 2020). Two other diagnostic companies in Germany are also developing rapid tests. See publications. [226](#) , [227](#) , [228](#)

Antibody detection

According to the WHO, antibody detection as a serological examination is also currently being developed (as of 17 January 2020). This will result in an assay (for example, an immunoassay such as ELISA) that detects antibodies from patient samples (blood serum) by antigen-antibody reaction. The WHO and the Robert Koch Institute in Germany call for the collection and preservation of serum samples of confirmed or suspected cases in the acute phase. The WHO recommends that the first sample be taken in the first week of the disease and the second sample three to four weeks later. This allows to check a seroconversion. [229](#) , [230](#) The first ELISA tests were conducted in a Chinese research laboratory in January 2020, and the nucleocapsid protein (N) of a bat coronavirus similar to SARS-CoV-2 was used as an antigen. Thus, the antibodies immunoglobulin G (IgG) and immunoglobulin M (IgM) could be detected in serum samples of a patient and their titres determined over several days during the course of the disease. In a second test, serum samples taken 20 days after the first symptoms were examined. All patient serums, but not the serums of healthy people showed a strongly positive IgG response, some patient sera also showed an IgM response, indicating a current immune response, i.e. a momentary infection. [231](#)

Cell test

The multiplication of the virus for research purposes in a cell culture has been successful in China, Australia, France, Germany and the USA, among others. [232](#) , [233](#) , [234](#) , [235](#) , [236](#) The Chinese scientists use epithelial cells of the human respiratory tract, which simulate the multilayered mucociliary epithelial tissue (ciliated epithelium), as well as the cell lines Vero E6 [237](#) and Huh-7 [238](#) , [239](#)

Treatment and Therapy

Treatment of the disease is symptomatic (pay attention to fluid and electrolyte balance!), oxygen (if still possible outpatiently) and, if necessary, antibiotics for bacterial concomitant infections and treatment of underlying diseases. Good to treat is especially possible fever. After the diagnosis has been made, bed rest and intravenous fluid administration are arranged in many cases. In severe cases, additional artificial ventilation or oxygenation bypassing the lungs, similar to a heart-lung machine, is often required.

Currently, no specific treatment is available; however, some pre-existing antivirals used, for example, against MERS-CoV and HIV, may also be effective in sarS-CoV-2 infection. [240](#) , [241](#) , [242](#) These include protease inhibitors such as indinavir, saquinavir, remdesivir, lopinavir/ritonavir and interferon-beta. [243](#)

The National Health Commission of the PRC recommends a combination of HIV protease inhibitors lopinavir and ritonavir with inhaled interferon alpha. In the United States, the nucleotide analogue remdesivir, which was actually developed against Ebola fever, was used. Proof of effect is still pending. [244](#) In addition, a vaccine against the virus began to be developed in several laboratories immediately after the publication of the RNA sequence of the virus. [245](#)

A randomized-controlled study of 199 patients in China showed no benefit to patients by the administration of lopinavir/ritonavir. [246](#) Case reports on treatment with oseltamivir also report no discernible antiviral effects. [247](#)

In addition to remdesivir, favipiravir and chloroquine, an active ingredient against malaria, are currently being tested in humans in China. [248](#) Clinical trials for remdesivir are taking place in China and other countries, favipiravir – an active ingredient used against the influenza virus among others – is being tested on 70 patients in Shenzhen and has been approved for China as an effective viral agent for five years under the name Favilavir for five years on February 16, 2020 and is now being produced. [249](#) According to Chinese media reports referring to the director of the National Biotechnology Center Zhang Xinmin, favipiravir shows a therapeutic advantage in clinical use. [250](#) Chloroquine showed promising results in an in vitro study in cell culture [251](#) and was also used clinically successfully, according to an article from China. [252](#) A first clinical trial from France, which also produced positive results, [253](#) has been criticised for its methodology. [254](#)

Currently, the clinics are calling on already recovered patients to donate blood in order to treat acute cases with antibody-rich plasma and to gain valuable insights into the development of a vaccine. [255](#) , [256](#) According to Chinese media reports of February 2020, these were

successfully used in humans. ²⁵⁷ In March, a German working group published the evidence of foreign immunization in animals. In the same study, the researchers demonstrated that the virus uses the serine protease TMPRSS2 ²⁵⁸ to penetrate the cells through the ACE2 receptor. The Japanese-approved drug camostat is an inhibitor of this protease that could be undergoing clinical trials. ²⁵⁹

In a diagnosis and treatment regimen for triage centers from Wuhan, the virostatic umifenovir and antibiotic treatment with linezolid, nemonoxacin or fluoroquinolones are used in suspected patients. The antibiotic treatment is justified by an expected second bacterial infection of the lung tissue damaged by the viral infection. The authors emphasize the importance of starting therapy before the rt-PCR test arrives on the basis of clinical, laboratory chemical and apparatus findings. Patients without evidence of a reduction in the number of lymphocytes in the blood, without viral pneumonia, without dyspnea (shortness of breath) and without reduction of oxygen saturation below 93% should be discharged into home care without RT-PCR testing. Oral administration of azithromycin or amoxicillin is intended for these patients. Patients with pneumonia of other genesis should be treated regularly and, if possible, outpatiently. Pregnant women and people over 65 years of age are more likely to be treated in hospital as special risk groups. The study authors justify their approach with the overburdening of health care in Wuhan. Treating as many patients as possible at home carries risks, but is necessary to care for the many critical cases. ²⁶⁰ Patients who develop acute lung failure due to viral pneumonia are subject to the usual principles of ventilation therapy for viral pneumonia. In order to enable lung-protective, mechanical ventilation, an intubation should be sought as early as possible. Too much water absorption should be avoided due to the risk of additional pulmonary edema. Non-invasive ventilation via high-volume oxygen carries the risk of aerosolization and thus an increased risk of virus infection for the medical personnel. ²⁶¹

The WHO temporarily advised against taking ibuprofen and recommended paracetamol instead. The French National Director of Health, Jérôme Salomon, also advised against taking non-steroidal anti-inflammatory drugs (NSAIDs) in general. These include aspirin and diclofenac. ²⁶² Ibuprofen and Glitazone increase the presence of the ACE2 ²⁶³ receptor, which acts as the virus's point of attack. ²⁶⁴ Shortly afterwards, the WHO withdrew its warning against taking ibuprofen if there was a suspicion of corona infection. ²⁶⁵

Currently, no vaccine is available to protect against COVID-19. According to the WHO, more than 30 vaccine candidates are currently under development, based on different platforms (e.g. DNA, RNA, protein subunit or vector vaccines). All of these candidates are

currently in the pre-clinical development phase, with individual developers already announcing the start of Phase 1 clinical trials for April/May.

Previous work on SARS-CoV is being utilised because SARS-CoV-2 and SARS-CoV both use the ACE2 receptor to enter human cells. ²⁶⁶ There are three vaccination strategies being investigated. First, researchers aim to build a whole virus vaccine. The use of such a virus, be it inactive or dead, aims to elicit a prompt immune response of the human body to a new infection with COVID-19. A second strategy, subunit vaccines, aims to create a vaccine that sensitises the immune system to certain subunits of the virus. In the case of SARS-CoV-2 such research focuses on the S-spike protein that helps the virus intrude the ACE2 enzyme receptor. A third strategy is the nucleic acid vaccines (DNA or RNA vaccines, a novel technique for creating a vaccination). Experimental vaccines from any of these strategies would have to be tested for safety and efficacy. ²⁶⁷ On 16 March 2020, the first clinical trial of a vaccine started with four volunteers in Seattle. The vaccine contains a harmless genetic code copied from the virus that causes the disease. ²⁶⁸

Passive antibody therapy, using blood donations from people who have recovered from COVID-19 is being investigated, a strategy that was tried for SARS. The mechanism of action is that the antibodies produced by the immune systems of those who have already recovered are transferred to people in need of them via a nonvaccine form of immunization. Other forms of passive antibody therapy, such as with manufactured monoclonal antibodies, are in development. Convalescent serum production could be increased for quicker deployment. ²⁶⁹ , ²⁷⁰

Impact on Life, Culture and the Economy

International health emergency, WHO action. On 30 January 2020, WHO Director-General Tedros Adhanom Ghebreyesus declared the existence of a public health emergency of international importance (international health emergency). This was due to concern about the possible spread of the virus epidemic to countries with a poorly developed health system, particularly in sub-Saharan Africa. The Director-General of the World Health Organisation expressly stressed that the health emergency had not been declared because of the situation in China. The WHO remains fully confident in China's ability to bring the epidemic under control in the country. ²⁷¹ On 11 and 12 February 2020, a conference was held in Geneva at the invitation of the World Health Organisation, where more than 400 experts from different fields discussed the epidemic. It involved the exchange of knowledge about the disease COVID-19 and the virus SARS-CoV-2 that causes it, as well as the definition of timely strategies, vaccines and treatment methods. ²⁷² , ²⁷³ Speaking at the Munich Security Conference on 15 February, 2020, Ghebreyesus ²⁷⁴ said that Chinese measures helped slow the spread of the epidemic to other states. He praised the good cooperation of the international research groups and explained that tests to diagnose the virus as well as personal protective equipment for medical personnel were sent to states with great need. ²⁷⁵ The WHO Situation Report – 29 of 18 February 2020 reported that test kits for laboratory diagnosis of COVID-19 were sent to 56 countries, as well as more than 12 tons of personal protective equipment to countries with special needs in the Western Pacific regions. , Southeast Asia and Africa. ²⁷⁶

According to media reports, the WHO Director-General stated on 24 February 2020 that the virus was not a pandemic, but epidemics in individual countries, as there has not been an uncontrolled global expansion of the virus. To speak of a pandemic would incite fear, would in principle be irrelevant and would not save human lives. ²⁷⁷

On 1 March 2020, the WHO issued a recommendation on the use of personal protective equipment. This was motivated by the worldwide scarcity of protective equipment, which already exists for breathing masks and is foreseeable for coats and eye protection. It recommends that nursing activities be carried out with mouth-nose protection. FFP-2 and N95 masks should be worn longer and in multiple patients to save material. These higher-quality masks should only be used for aerosol-forming procedures on the patient. The general use of masks in the population is recommended only for carers and persons with respiratory problems. ²⁷⁸

Researchers from Hong Kong published a recommendation to the

contrary in the journal *The Lancet* on March 3, 2020. The Chinese model with far-reaching social distancing measures including the requirement of masks in public spaces for all is superior to the model of contact tracking and quarantine alone. The latter was rated as a failure by the authors. Panic purchases take place in countries with and without a mask bid, and in the absence, improvised masks or prolonged use over the actual wearing period are recommended. This should help to reduce transmission by non-complaining infected persons. The authors recommended that decision-makers in countries without a mask bid reconsider their policies. On 11 March 2020, the WHO officially classified the effects of the virus as a pandemic.

Hospitals postpone plannable and non-essential operations. The biggest concern is the supply of protective equipment. ²⁷⁹

Aviation and travel. International airlines such as Air France stopped direct flights to Wuhan on 23 January 2020, later to the whole of China. U.S. airlines canceled flights to China until the end of April. ²⁸⁰ On 29 January 2020, following British Airways ²⁸¹, Lufthansa and other airlines announced that it would cease air traffic between the People's Republic of China and Germany until 9 February, including with its subsidiaries Swiss and Austrian Airlines, ²⁸² and extended the February 3 the cessation of flight operations until the end of February, for the destinations Nanjing, Shenyang, Qingdao, Shanghai and Beijing even until the end of March. ²⁸³, ²⁸⁴ By mid-February, about 70 lines had suspended flights to China, with another 50 restricted. ²⁸⁵

The authorities in Mongolia closed the country's border with the People's Republic for car traffic from 27 January 2020, with serious consequences for bilateral trade in goods. Universities and educational institutions will also remain closed until 2 March. Public events are prohibited for the same period. ²⁸⁶

Hong Kong intended to disrupt major transport routes, in particular rail and ferry services, to and from the heartland of China on 30 January 2020. Air traffic should be reduced and private travel permits should no longer be issued for the time being. ²⁸⁷ On 5 February, it was announced that arrivals from mainland China would be quarantined for 14 days; persons living in Hong Kong who return from traveling to China. ²⁸⁸

North Korea responded to the epidemic with a one-month mandatory quarantine for all foreigners entering China. According to the Russian Embassy in Pyongyang, no cases have been reported by North Korea so far (January 28, 2020). The Philippines temporarily does not grant entry visas to Chinese citizens. ²⁸⁹ On 31 January, the authorities in Singapore announced that they would no longer allow visitors to the country who had been in China for the last fortnight. Residents and persons with permanent residence permits will continue

to be allowed to enter the country. However, a fortnight's absence from work after stay in China is recommended. ²⁹⁰

The International Air Transport Association (IATA; the international aviation umbrella organization) estimated on February 21, 2020 that the expected economic losses to international air traffic would be about 30 billion U.S. dollars, of which 27.8 billion U.S. dollars to the Asia-Pacific region and 1.5 billion U.S. dollars to the rest of the world. ²⁹¹

On February 27, Saudi Arabia announced that it would no longer issue visas for the Small Pilgrimage. Similarly, all travellers from countries affected by the virus are refused entry. ²⁹²

According to the World Health Organization's Situation Report – 39, on February 27 there were travel restrictions in 41 member states that were justified by the health protection of the population, including in 11 countries also restrictions imposed on countries other than China. In most cases, either the entry of persons from the PRC or other countries affected by the coronavirus epidemic has been prohibited, quarantine or isolation measures have been imposed for those entering the country, or visas have been suspended. At the beginning of March 2020, British Airways cancelled hundreds of return flights to the USA, Germany, Italy, France, Austria, Ireland and Switzerland for the period from March 17 to 28 due to reduced demand. ²⁹³ EasyJet ²⁹⁴ and Ryanair ²⁹⁵ also announced that they would cancel numerous flights to Italy. Lufthansa cancelled flights, asked its employees to submit unpaid leave or to reduce the work offered on a part-time basis; it also examined the possibility of registering short-time work with the Federal Employment Agency. ²⁹⁶

Since 6 March 2020, there has been a broad ban on entry in Israel for arrivals from Germany, France, Austria, Switzerland and Spain. Only those who can prove an address in Israel at which they can undergo a two-week domestic quarantine are allowed to enter. The same rule already applied to travellers from Italy and several Asian countries, including China and Thailand. ²⁹⁷ On 6 March 2020, Bhutan closed its border for all tourist trips by foreigners. ²⁹⁸ Passengers reported almost empty planes, airlines reported no-show shares of up to 50%. Airlines are pushing for a change to the requirement that they exercise 80% of their take-off and landing rights at major hubs in order not to lose them. ²⁹⁹

On 8 March 2020, El Salvador issued a ban on entry for travellers from Germany, France, Italy, Iran and South Korea. Only Salvadoran citizens and diplomats are allowed to enter from these countries, but are quarantined for 30 days. ³⁰⁰

On 10 March 2020, Austria issued a ban on entry for non-Austrians coming from Italy. Transit traffic to, for example, Germany is

still possible, but Austria must be passed through without stopping. Air and rail services to Italy will be suspended. ³⁰¹

With effect from 14 March, 4:59 a.m. Central European Time (CET), the United States will close its borders to persons who have been in Schengen countries for the last 14 days. ³⁰² , ³⁰³ On the same day, Turkey stopped air traffic with other countries. ³⁰⁴ On 16 March 2020, SAS Scandinavian Airlines ceased commercial operations. ³⁰⁵ Austrian Airlines and Laudamotion also shut down operations completely. ³⁰⁶ 15 Lufthansa aircraft parked at Berlin Brandenburg Airport on 21 March 2020. On 19 March, it was announced that Lufthansa was cancelling 95% of all flights due to the entry bans imposed by many countries. ³⁰⁷ On March 21, Cuba announced an immediate ban on foreigners entering the country. ³⁰⁸

Harbour closures. Many states and cities around the world have closed their ports to cruise ships. These include ³⁰⁹ Belgium

China, India, Israel, Italy (no embarkation), Jamaica, Canada, Maldives, Monaco (until the end of April), New Zealand (until June 30), Norway, Portugal (with Madeira and Azores), Singapore, Spain (until 26 March), USA (no entry for Europeans).

The cruise ship Diamond Princess was quarantined at Yokohama Port on February 5, 2020, with approximately 3,600 passengers and crew members. Infected persons were distributed to hospitals in Yokohama and the surrounding area for treatment. By February 10, 2020, 130 people had tested positive, their number continued to grow by the day, and on February 13, according to media reports, there were 219, including 15 crew members and a health authority employee. ³¹⁰ , ³¹¹ By 15 February, 355 passengers and crew members had already tested positive for the coronavirus, by 17 February 2020, the number of people infected had increased to 454 and was 542 on 19 February. On 20 February, it was announced that the number of people infected had increased to 454 and was 542 on 19 February. On 20 February, it was announced that the number of people infected had increased to 454. Two positively tested Japanese passengers had died at a hospital in Yokohama and the number of infected had risen to 621. As of 3 March, the number of people infected was 706, with a total of six deaths and 32 critical. ³¹² , ³¹³ , ³¹⁴ On 12 February 2020, the Japanese authorities began to disembark passengers who were in poor health; Positively tested persons came to an insulating station, negatively tested persons could be taken to a quarantine station. ³¹⁵ On February 17, a large proportion of the approximately 400 U.S. passengers were brought back to the U.S. to remain in quarantine for 14 days at military bases in California and Texas, and 44 Americans with positive test results were sent to Japanese hospitals. Australia announced it would take 200 compatriots off board and quarantine

northern Australia for 14 days. ³¹⁶ Other countries, such as Great Britain, Italy, Canada, South Korea, and Hong Kong, announced that they would bring their citizens back home. On February 18, the U.S. Centers for Disease Control and Prevention (CDC) imposed a restriction on entry to protect U.S. public health, which applied to all persons on board the cruise ship. had stopped. After leaving the ship, they had to wait two weeks before being allowed to enter, affecting more than 100 U.S. citizens. People who had already returned had to remain in quarantine in the USA. ³¹⁷ From 19 February, people whose test was not positive were allowed to leave the Diamond Princess. The process was scheduled to take three days, with older people taking precedence. According to media reports, people were taken to downtown Yokohama or other train stations in the Tokyo area. Those who had close contact with people who later tested positive were not allowed to leave the ship at first. On 22 February, more than 100 passengers (contact persons) were brought ashore to a quarantine facility. Japan reported a positively tested disembarked passenger who had travelled home by public transport; The Japanese Minister of Health admitted on 22 February that the necessary virus test had been missed on 23 passengers before disembarkation. ³¹⁸ On 21 February, Australia reported a positive viral test on two returned passengers. ³¹⁹ On 22 February, the German ex-passengers landed on the military part of Berlin-Tegel airport, to spend another two weeks in domestic isolation. ³²⁰ An Israeli passenger, whom the Japanese authorities had previously dismissed as "cured" and had flown on a scheduled flight to Israel, was again identified as a carrier of the virus and quarantined upon his arrival on 28 February. ³²¹ On March 2, 2020, the captain was the last disembarking player to leave the Diamond Princess. ³²²

After an inspection of the ship, the infectiologist Kentaro Iwata, who works at the University of Kobe, criticized the Japanese health authorities and accused them of errors in the management of the quarantine. For example, there had been no division into "green" (virus-free) and "red" (possibly contaminated and therefore not safe) zones, nor were there rules for wearing a mouthguard. His criticism attracted a lot of attention in Japan as a video on YouTube and led, among other things, to a question from the opposition in parliament to the Health Minister Katsunobu Kato. ³²³ The American infectiologist Anthony Fauci, director of THE US-based NIAID, considered the quarantine strategy on board the ship to be a failure due to the high number of infections. ³²⁴ The US Disease Control Authority (CDC) assessed this similarly and warned that the dismissal of passengers posed a risk to the spread of the virus. ³²⁵ , ³²⁶ , ³²⁷ , ³²⁸

Sports and culture. On 29 January 2020, the Fédération Internationale de Ski decided to cancel two Alpine Ski World Cup

aces in Yanqing on 15 and 16 February for safety reasons. The races were intended as the main rehearsal for the 2022 Winter Olympics.³²⁹ Also on 29 January, the World Athletics Federation decided to cancel the World Indoor Championships in Nanjing, China. It was originally scheduled to be held from 13 to 15 March. It was no longer possible to move to another location.³³⁰

On January 31, the World Professional Billiards & Snooker Association announced that it would postpone the China Open in snooker scheduled for March 30 and April 5 in Beijing.³³¹ On February 2, the organizers of the FIA Formula E Championship canceled the Sanya E-Prix on March 21. However, it was left open to the race later.³³² A day later, the Professional Squash Association postponed the hosting of two tournaments to an as yet unknown later date, including the Macau Open.³³³

On February 12, the FiA postponed indefinitely the Chinese Grand Prix scheduled for April 19 at the Shanghai International Circuit. On February 19, the virologist Hitoshi Oshitani of the Japanese University of Tohoku gave an initial assessment of the infections on the cruise ship Diamond Princess regarding the 2020 Summer Olympics. He stressed the importance of stopping the chains of infection quickly, otherwise he sees the hosting of the Tokyo Olympics in jeopardy.

On 26 February, the German Open, an international badminton tournament that was to start on 3 March 2020 in Mülheim an der Ruhr in the Innogy Sporthalle, was cancelled and postponed to an unspecified later date.³³⁴ A day later, the Union Mondiale de Billard announced that the three-band World Championship for national teams scheduled to take place in Viersen from 5 to 8 March 2020 would not take place at that time; At the same time, an edition of the Survival 3C Masters scheduled for mid-April in Seoul was cancelled.³³⁵ Also on 8 March, the Engadin Ski Marathon, the largest cross-country skiing event in Switzerland, will not take place.³³⁶

The opening race of the UCI World Cup Milan-Sanremo, scheduled for 21 March, has been cancelled. Ongoing tours have been shortened or cancelled. At Paris-Nice, spectators were denied access to the target area in order to avoid the usual mass crowds there. Crews and isolated drivers made the journey home prematurely in order to prevent any entry bans from their home countries.

On 16 March 2020, the organisers canceled the traditional rowing regatta Boat Race on the Thames between the universities of Oxford and Cambridge, scheduled for 29 March.³³⁷

World Wrestling Entertainment announced on March 16, 2020, the Wrestlemania 36 major event scheduled for April 5 in Tampa at Raymon James Stadium, complete without spectators at the WWE

Performance Center.

A day later, UEFA announced that it was postponing the European Men's Championship, originally scheduled for summer 2020, by one year. ³³⁸ , ³³⁹ The Copa America scheduled for the summer of 2020 was also postponed by one year on the same day. In tennis, the French Open scheduled for May and June was moved to September and October. ³⁴⁰ The Eurovision Song Contest 2020 in Rotterdam is cancelled. ³⁴¹ The Olympic Games in Tokyo will be postponed by one year due to the Corona crisis. School-leaving exams are also postponed. Several film studios, including the Walt Disney Company, have postponed movie launches from March and April 2020. Restaurants and cultural institutions, theatres, opera houses, venues, zoos and libraries close their doors indefinitely. The cultural life is paralyzed.

Company. Due to hamster purchases, various products such as rice, pasta, canned food and toilet paper are temporarily sold out. In German supermarkets there is a lack of pasta, soap, disinfectants and, amazingly, toilet paper. Even the author of the present work as a physician is allocated hand sanitizer by pharmacies.

On January 24, 2020, Shanghai Disneyland Park announced that it was temporarily closing its doors due to the virus outbreak. ³⁴² McDonald's temporarily closed all restaurants in Wuhan, Ezhou, Huanggang, Qianjiang and Xiantao on the same day. ³⁴³ Google closed its offices, Toyota temporarily halted production, Starbucks closed its stores in 2000 ³⁴⁴ , McDonald's closed 300 restaurants ³⁴⁵ , IKEA first closed half of its furniture stores, then all 30. Apple closed its stores. ³⁴⁶ , ³⁴⁷ Additional business losses are expected in the wake of the epidemic due to lost overseas orders in the Conferences and Incentive Events segments.

In mid-March, Daimler and Volkswagen announced that they would immediately halt their car production in Europe for at least two weeks. Retailers reported higher sales of disinfectants and detergents, durable food and fresh food. Online mail order retailer Amazon announced 100,000 additional full-time and part-time jobs for warehouse and delivery in the United States. Internet providers have seen a high volume of data worldwide in the face of video telephony, chats and media consumption. Streaming providers Netflix and Youtube temporarily reduced the bit rates of their videos in the face of looming restrictions on their services, taking into consideration a reduction in image quality; Amazon Prime followed them a little later.

Economy and stock exchanges. As with the SARS pandemic 2002/2003, economic effects are already apparent shortly after the first cases of the disease became known. It is estimated that the SARS pandemic cost the global economy about 40 billion dollars (equivalent

to about 0.5 percent of global GDP). ³⁴⁸ , ³⁴⁹

According to a data analysis, passenger traffic, air and rail transport, exports decreased. Sales and market were lower in February 2020 compared to the same period last year. ³⁵⁰

Media reported on hamster purchases (before the curfew). ³⁵¹ Hotels, restaurants and entertainment facilities are particularly affected. Real estate sales also experienced a slump. ³⁵²

The economies of East Asia were the main affected by the epidemic. Retail trade, restaurant and conference organisers, sporting events, tourism and commercial aviation are directly affected. The International Air Transport Association predicted a loss of revenue of up to 4.6 billion euros. The travel restrictions imposed by the Chinese governments cause significant short-term cuts in the economic conditions of Japan, Thailand, and Vietnam. Thailand's tourism industry is facing a slump in sales, with about 60% of Chinese tourists coming to the country on the basis of the now banned group travel. For Vietnam, Chinese visitors make up a third of all international tourists in the country, and in Australia, for example, it is 15 percent. The Asia-Pacific countries concerned are expected to respond with a range of fiscal and monetary policy instruments to positively impact the economic impact in the short term.

At the end of January, both German and US exchanges recorded only a temporary decline. With the announcement of Corona Falls in Italy, the German and American stock markets suffered a slump of more than 10% from the recent highs within four days. On February 27, 2020, the Dow Jones recorded the highest loss in points (but there were several higher losses in percentages). ³⁵³ The DAX, Deutscher Aktienindex (German stock index) gave up 12.4% in the last week of February. ³⁵⁴ In contrast, the price of gold, as a less risky investment, temporarily rose to the highest level in the last seven years. Two weeks later, for the first time, such global price losses occurred again, as it has since the Great Recession during the global financial crisis in 2008. On 9 March, the DAX suffered the largest percentage daily loss since the terrorist attacks of September 11, 2001. ³⁵⁵ , ³⁵⁶

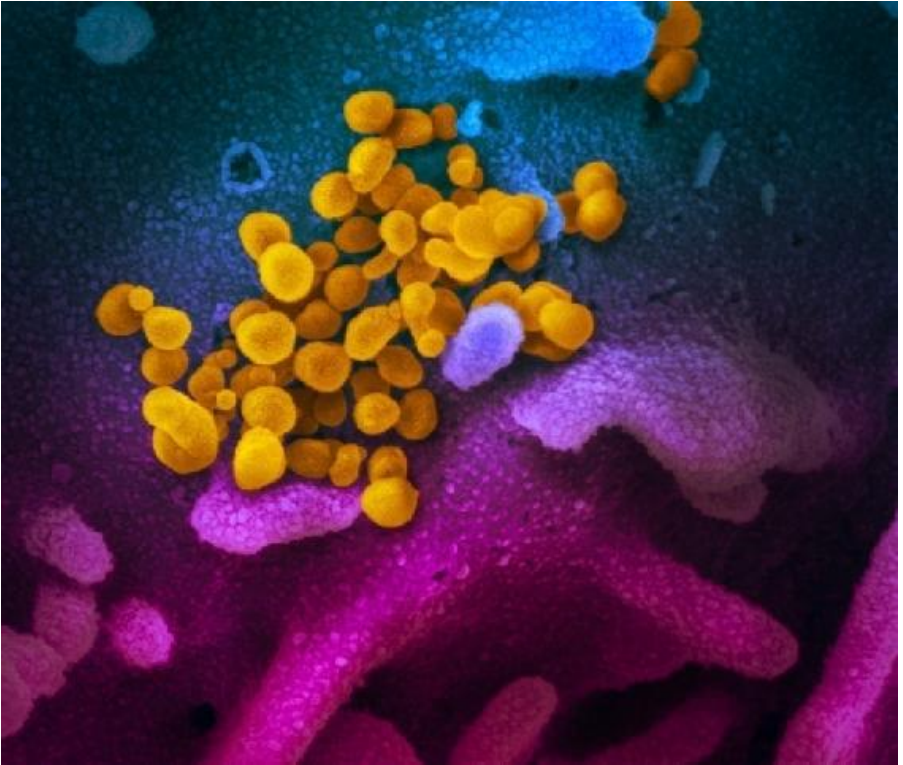
Politics and democracy. Politicians are responding to the number of infected persons and dead. Governments declare a state of emergency. Laws are passed. Fundamental democratic rights and thus the personal freedom of the individual are restricted. Gatherings of people are prohibited. The aim is to restrict social contacts and thus slow down the spread of the virus so as not to overload the capacity in intensive care units ...

It is difficult to gain anything positive from the current crisis. However, such transnational humanity and international aid are also desirable for a post-Corona period.

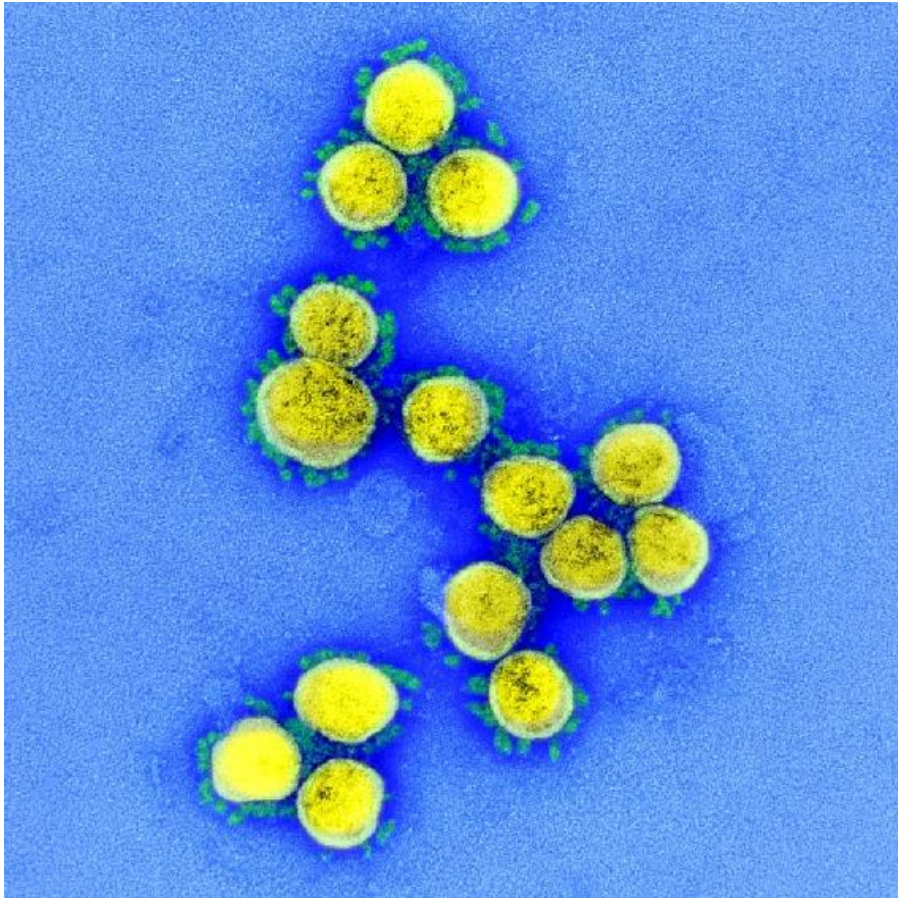
Beauty of Terror

The artfully created electron microscopic images fascinate the viewer. The beauty and aesthetics of the virus almost obscure how merciless and cruel it can bring death and misery upon people.

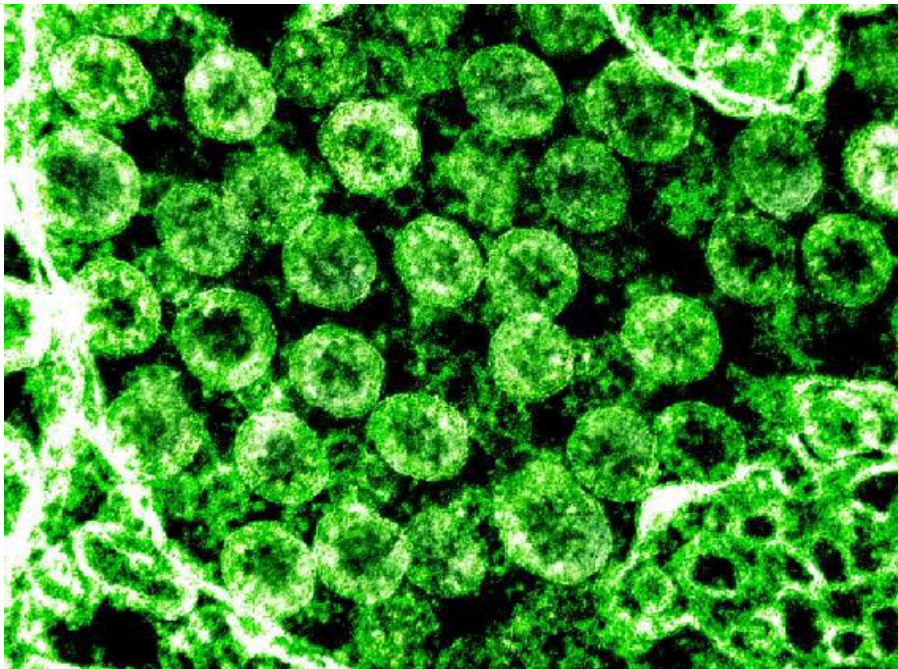
This images captured by Institutes of the National Institute of Allergy and Infectious Diseases of the United States of America (NIAID ³⁵⁷ and NIAID-RML ³⁵⁸):



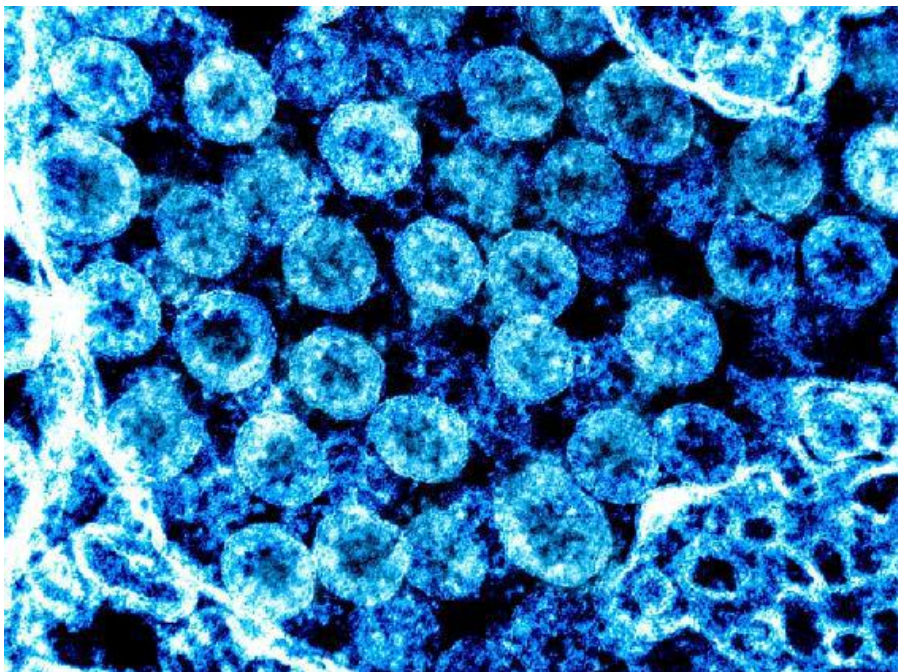
Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (yellow)—also known as 2019-nCoV, the virus that causes COVID-19 —isolated from a patient in the U.S., emerging from the surface of cells (blue/pink) cultured in the lab. NIAID-RML



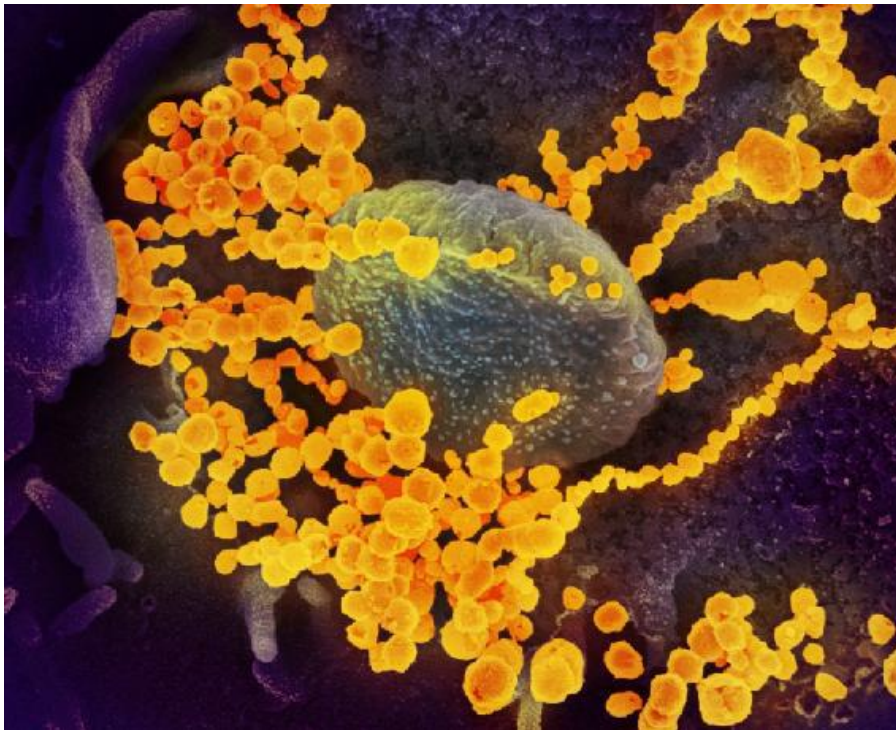
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID



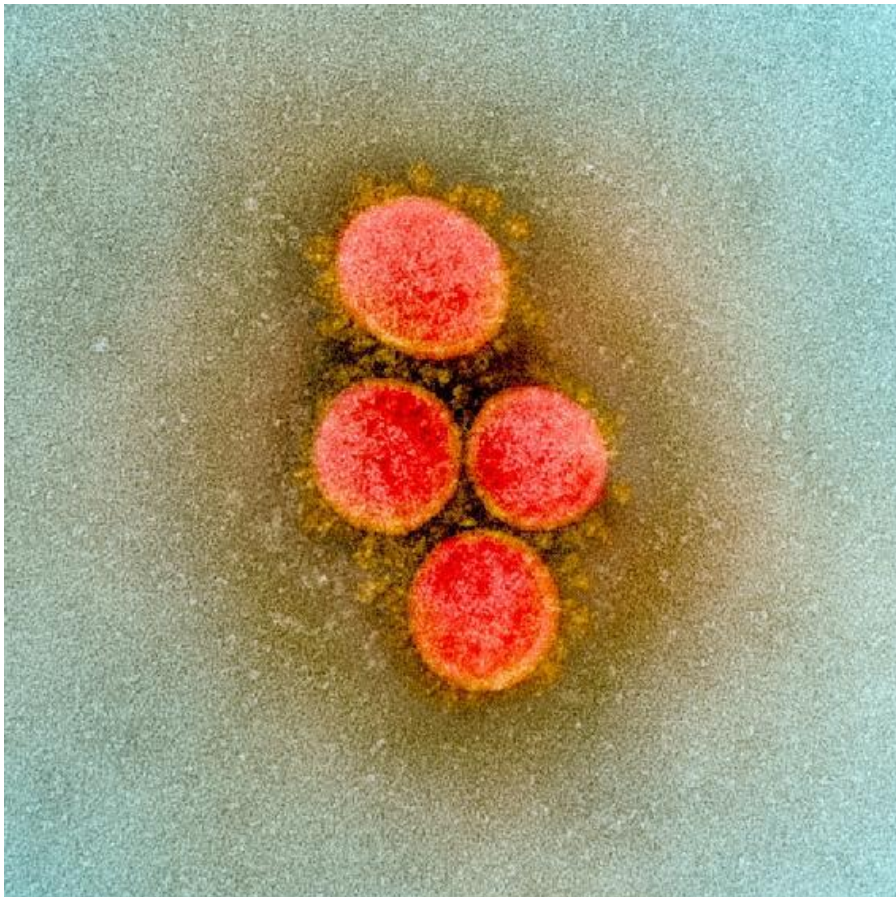
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID



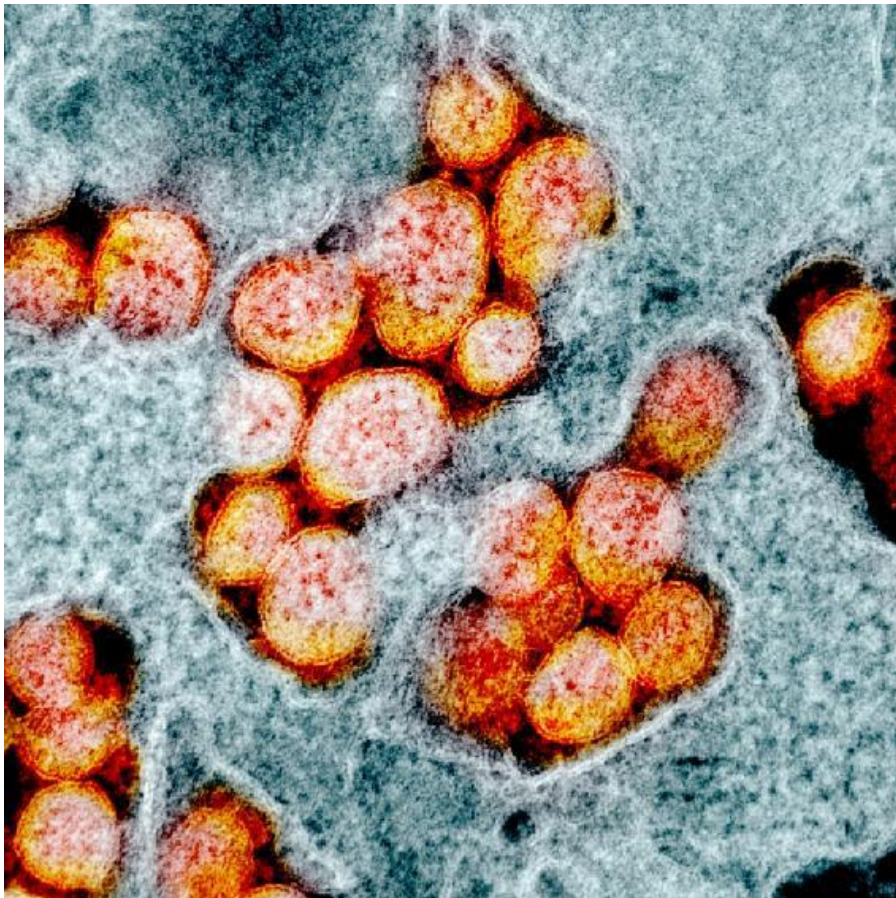
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID



Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (round gold objects) emerging from the surface of cells cultured in the lab. SARS-CoV-2, also known as 2019-nCoV, is the virus that causes COVID-19. The virus shown was isolated from a patient in the U.S. NIAID-RML



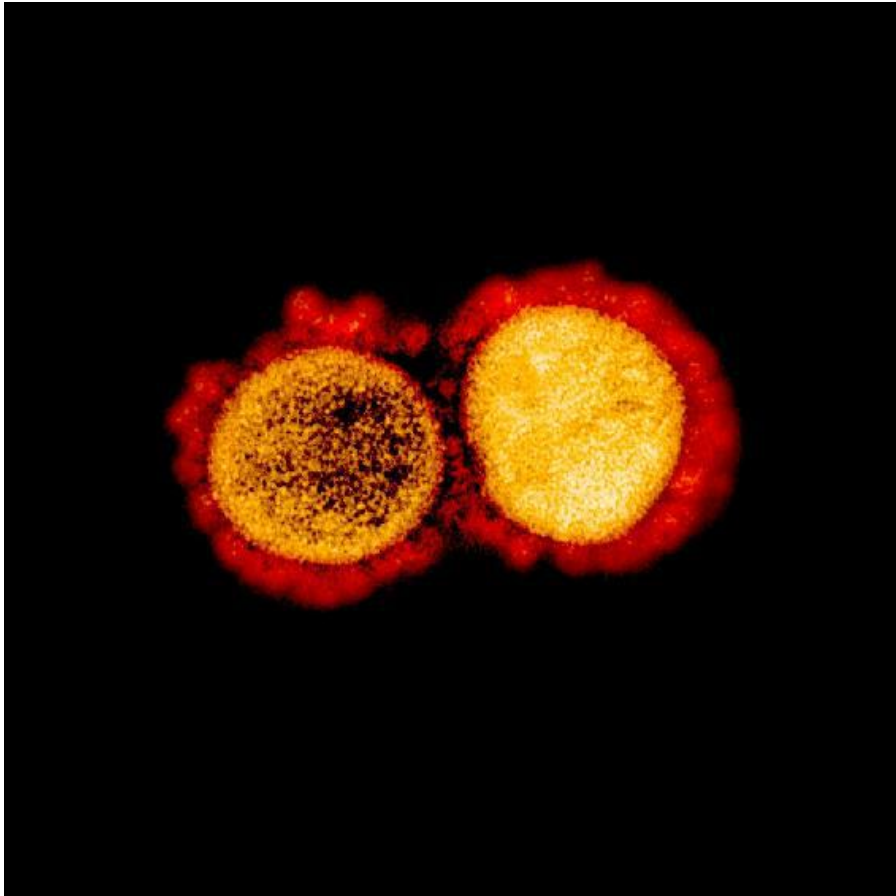
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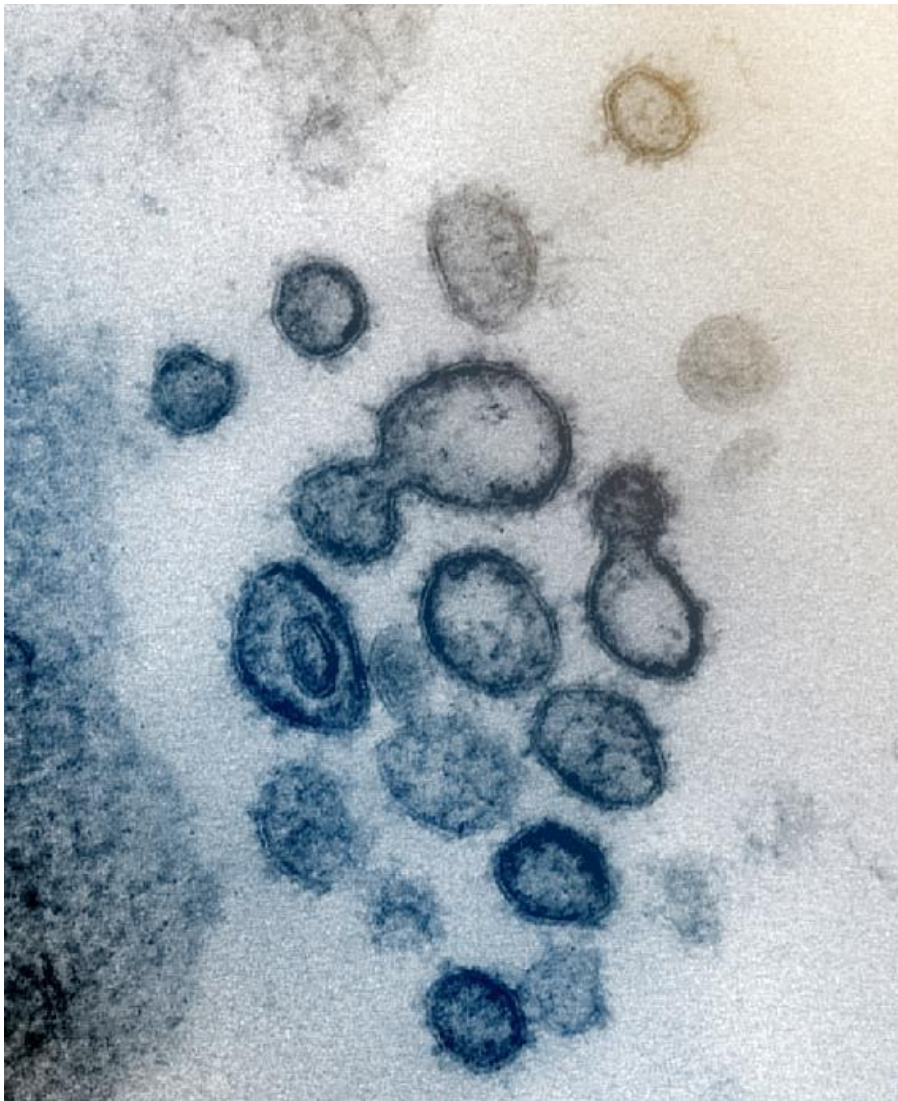
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID



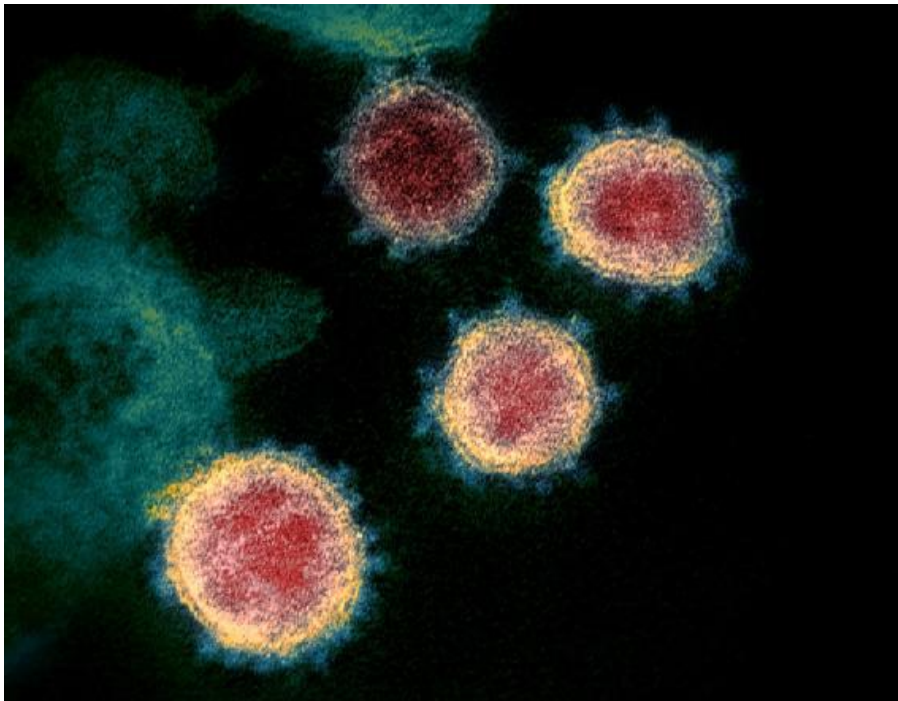
Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (round magenta objects) emerging from the surface of cells cultured in the lab. SARS-CoV-2, also known as 2019-nCoV, is the virus that causes COVID-19. The virus shown was isolated from a patient in the U.S. NIAID-RML



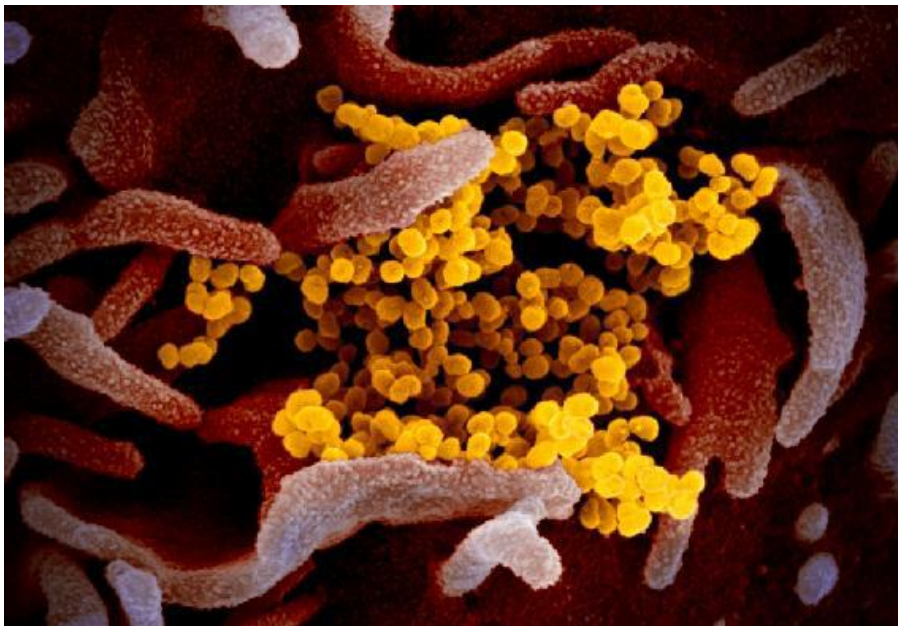
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID

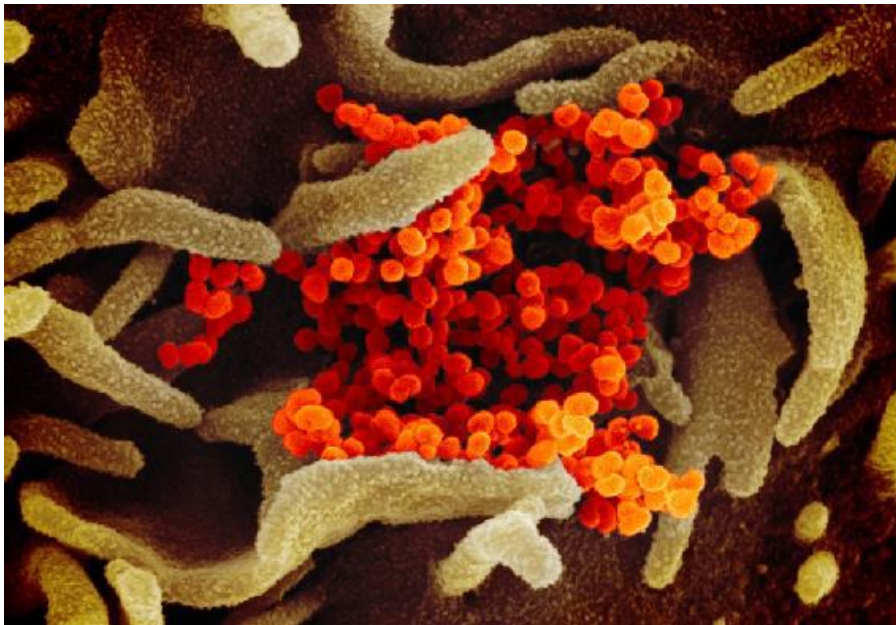


Novel Coronavirus SARS-CoV-2. This transmission electron microscope image shows SARS-CoV-2—also known as 2019-nCoV, the virus that causes COVID-19— isolated from a patient in the U.S. Virus particles are shown emerging from the surface of cells cultured in the lab. The spikes on the outer edge of the virus particles give coronaviruses their name, crown-like. NIAID-RML

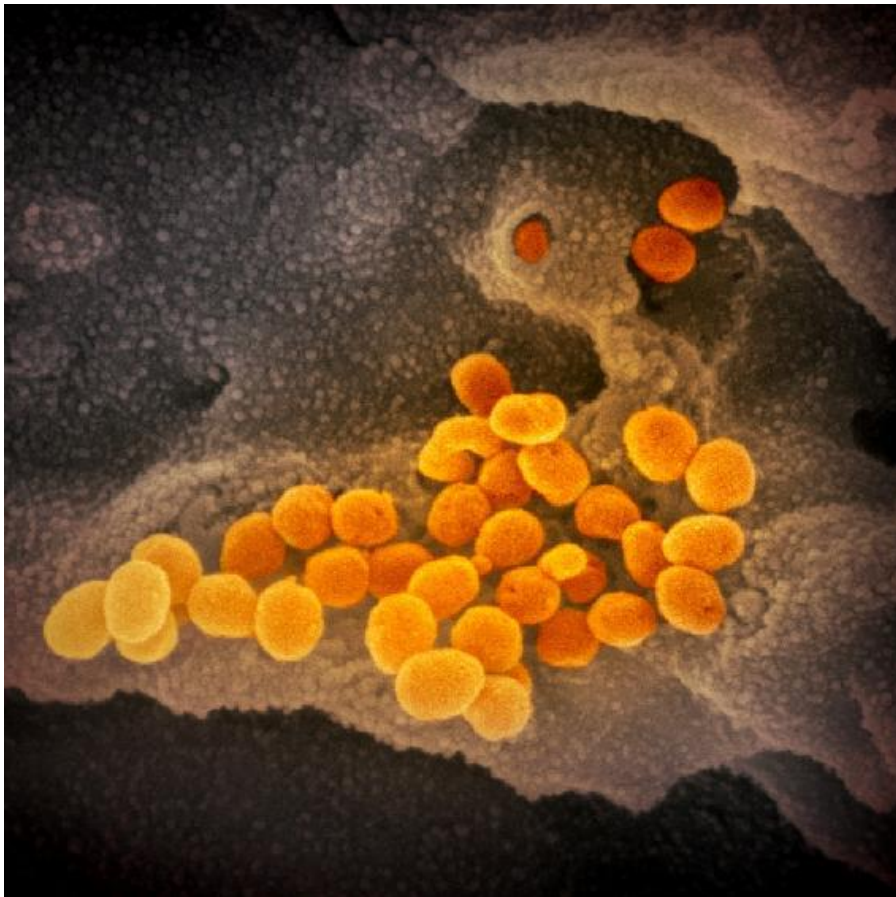


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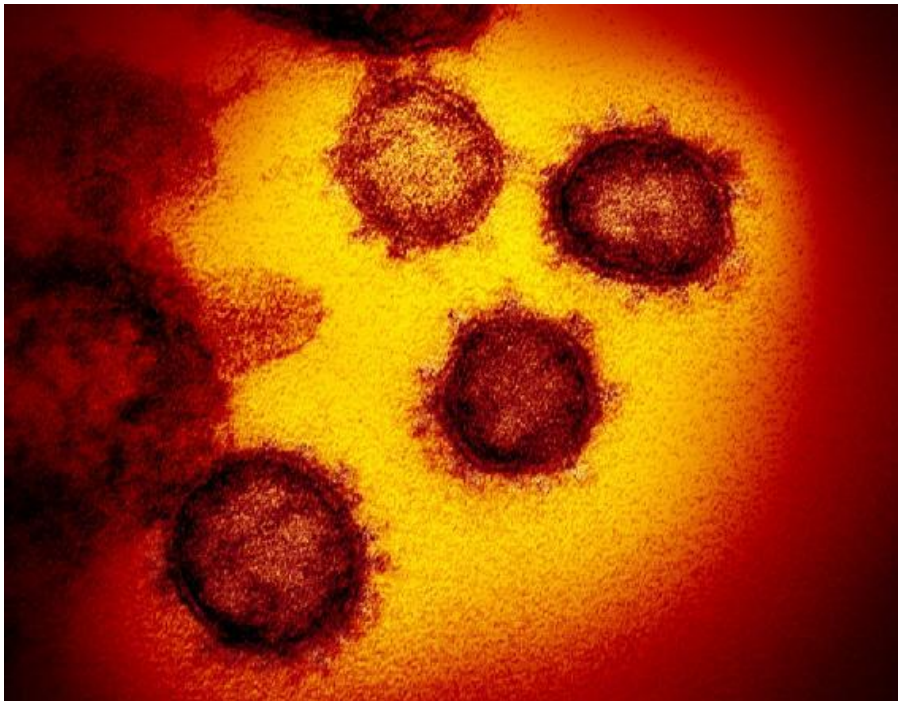




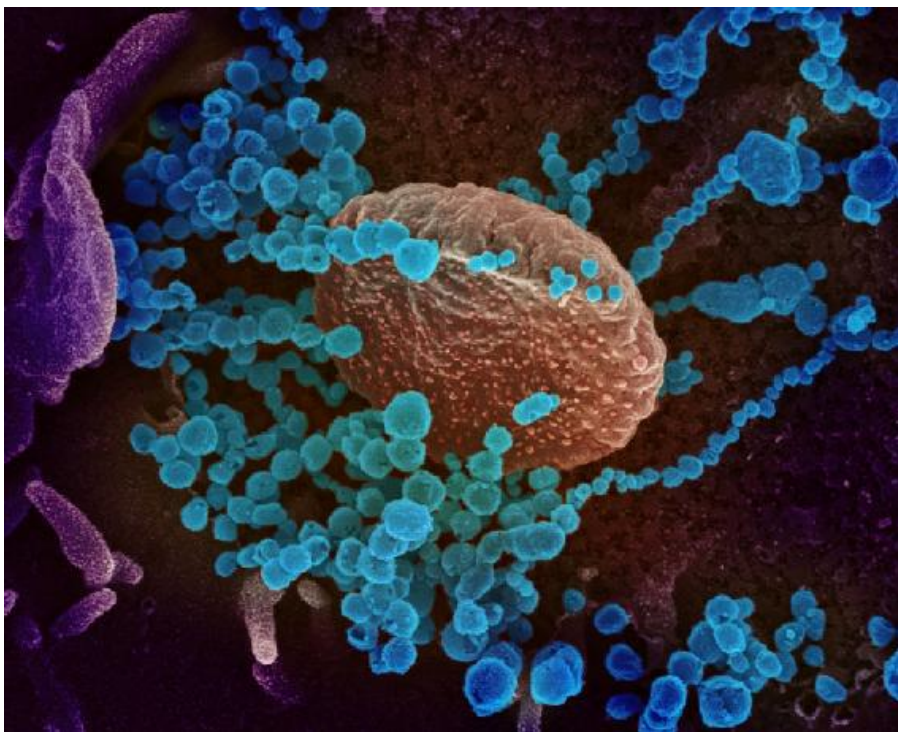
Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (yellow or orange) – also known as 2019-nCoV, the virus that causes COVID-19 – isolated from a patient in the U.S., emerging from the surface of cells (pink or green) cultured in the lab. NIAID-RML



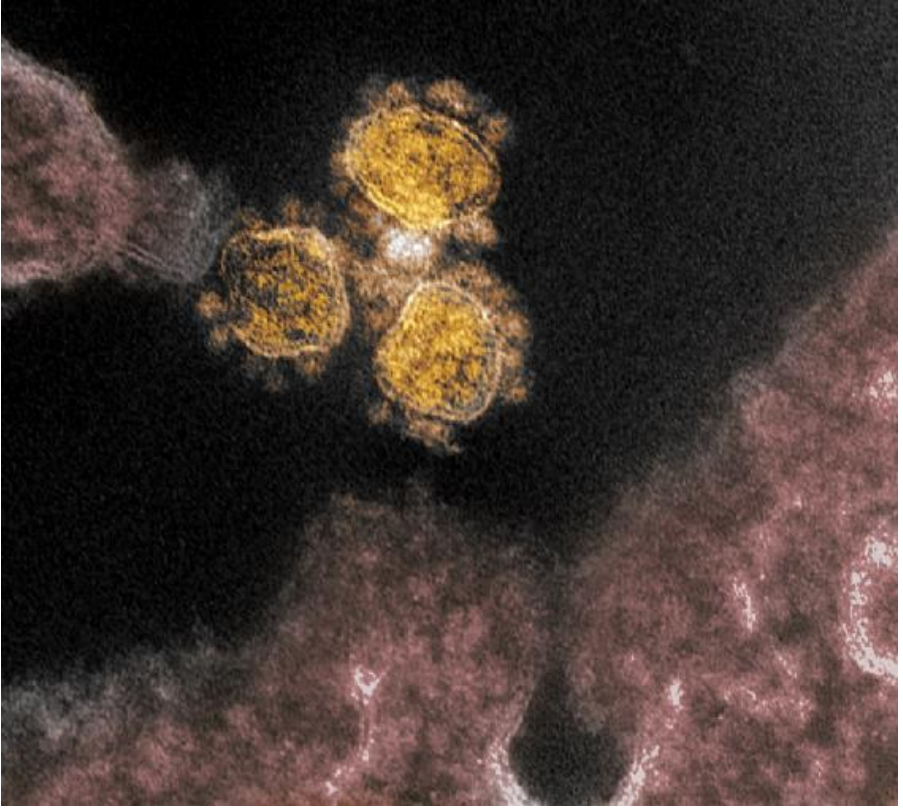
Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (orange)—also known as 2019-nCoV, the virus that causes COVID-19—isolated from a patient in the U.S., emerging from the surface of cells (gray) cultured in the lab.: NIAID-RML



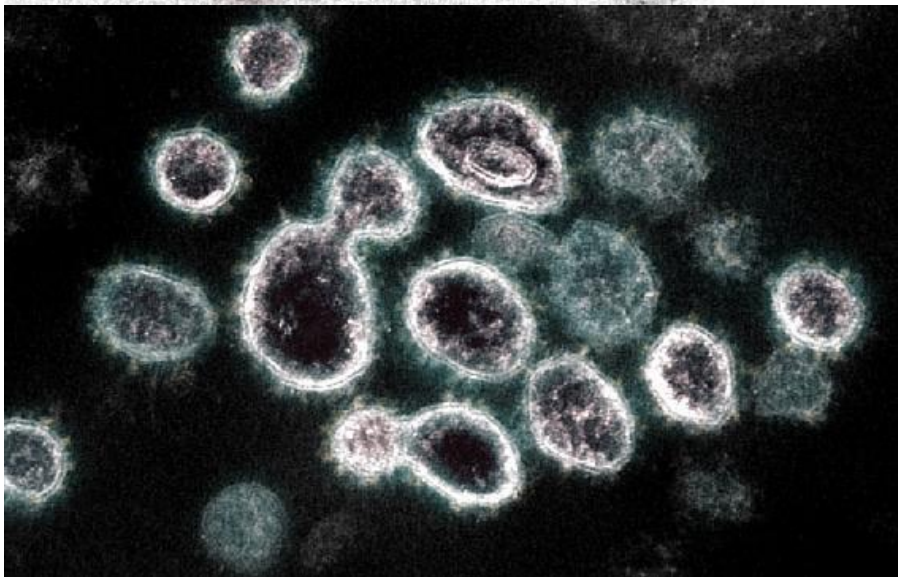
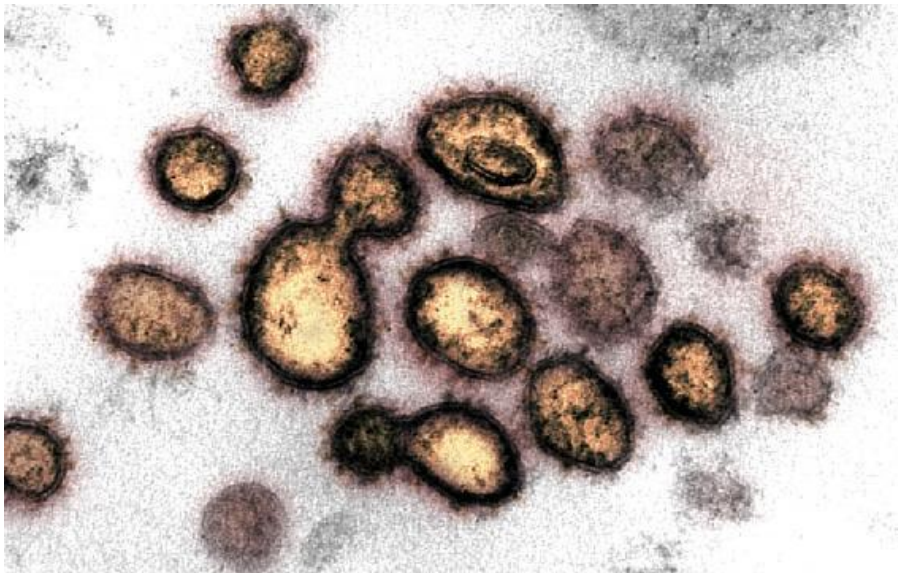
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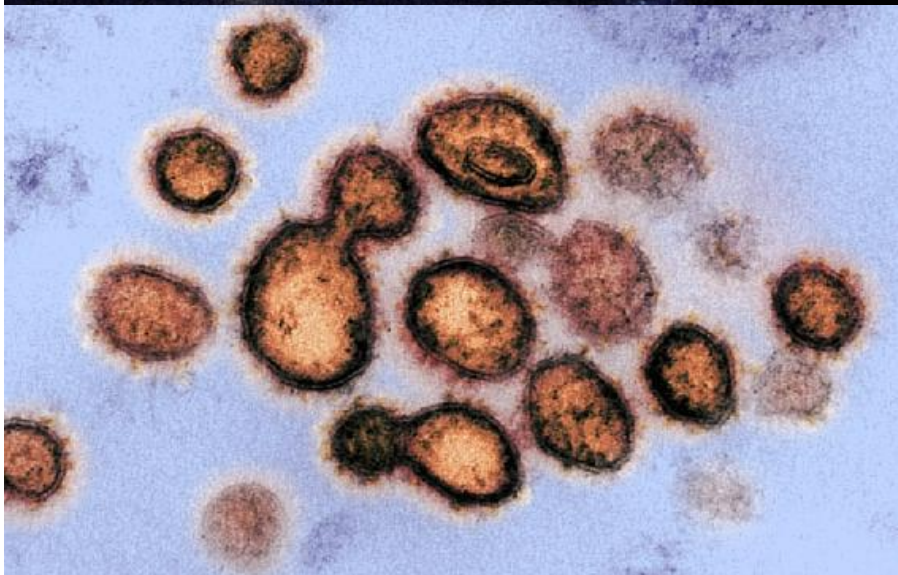
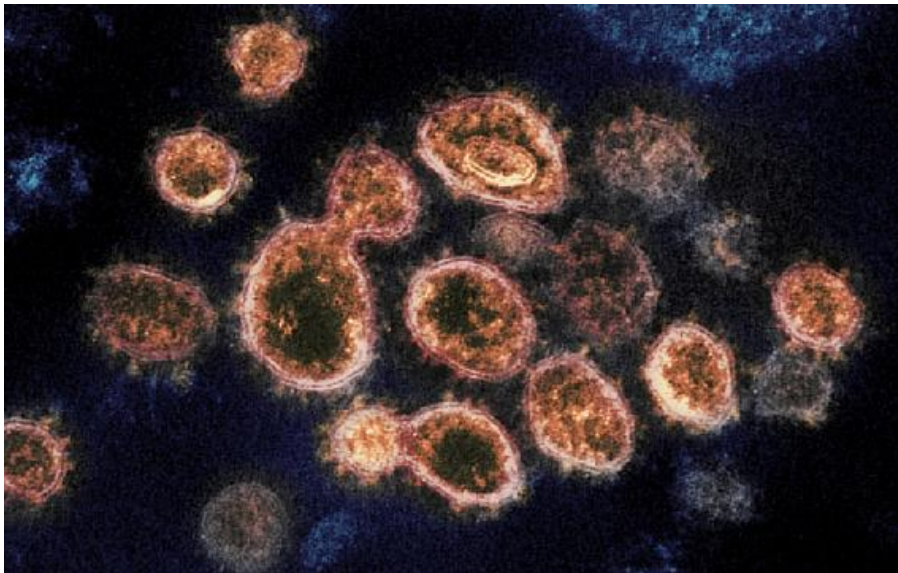
Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (round blue objects) emerging from the surface of cells cultured in the lab. SARS-CoV-2, also known as 2019-nCoV, is the virus that causes COVID-19. The virus shown was isolated from a patient in the U.S. NIAID-RML



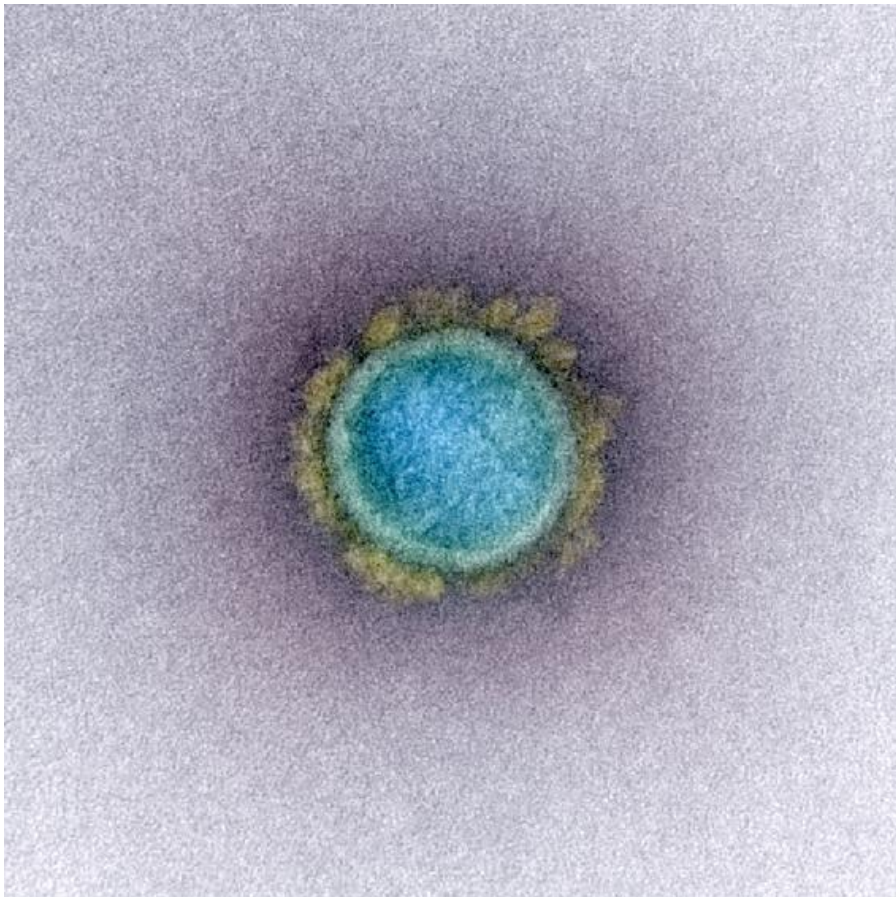
Novel Coronavirus SARS-CoV-2. This transmission electron microscope image shows SARS-CoV-2, the virus that causes COVID-19, isolated from a patient in the U.S. Virus particles (round gold objects) are shown emerging from the surface of cells cultured in the lab. The spikes on the outer edge of the virus particles give coronaviruses their name, crown-like. NIAID-RML



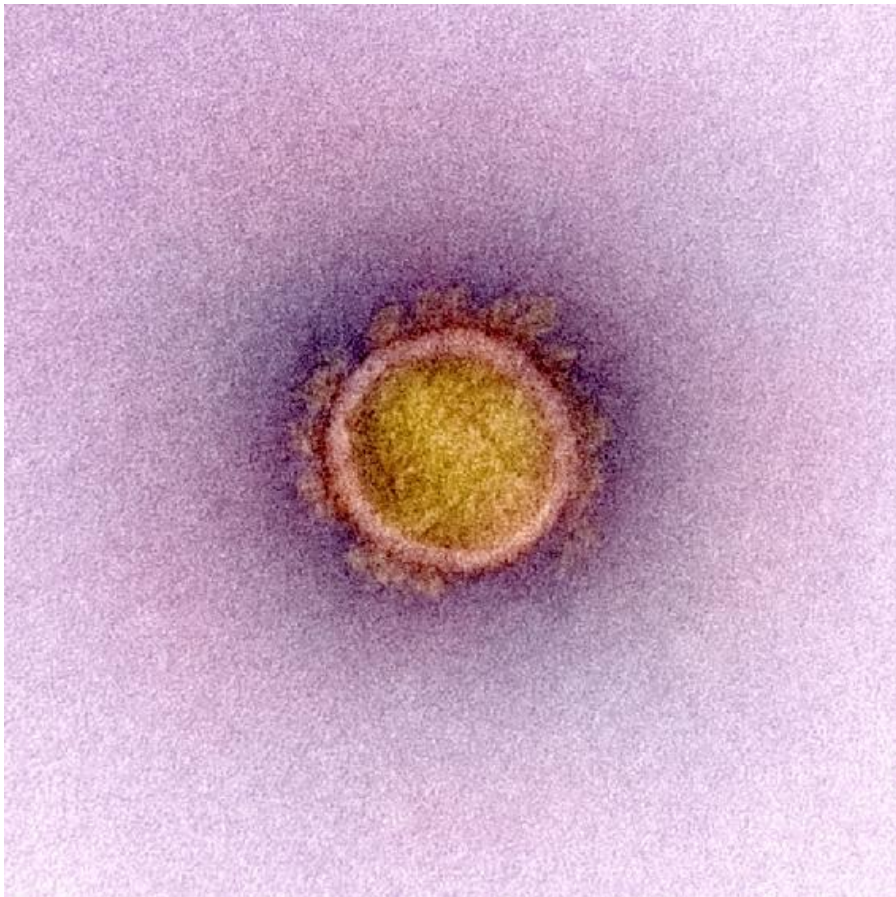
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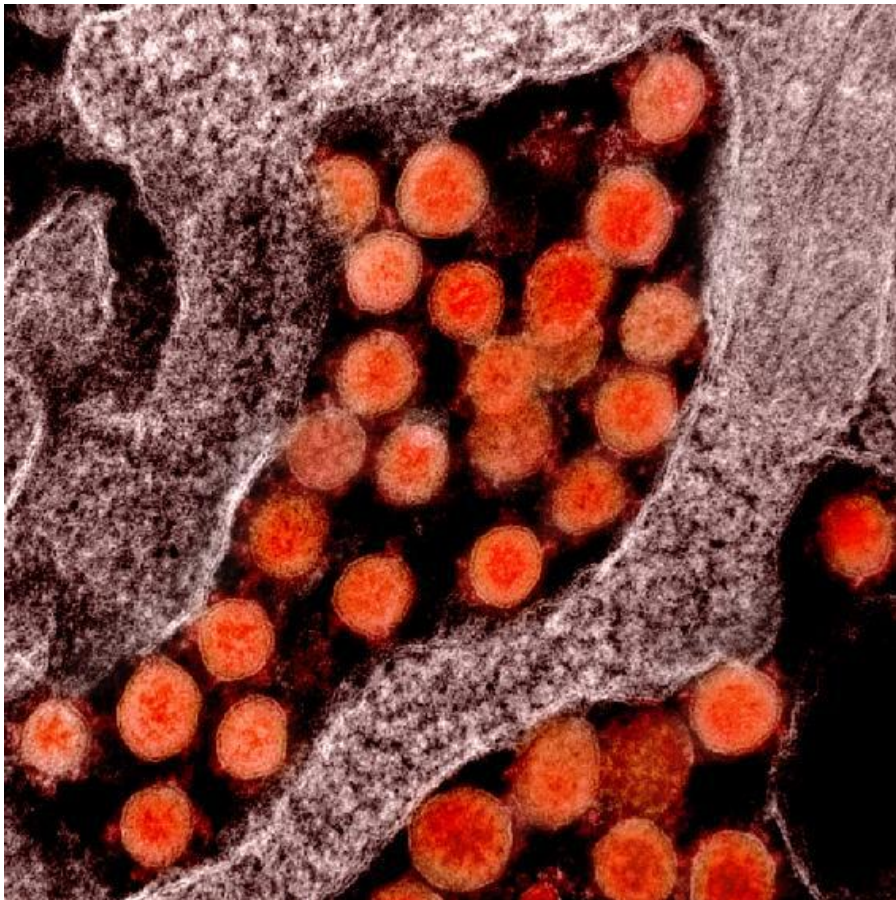
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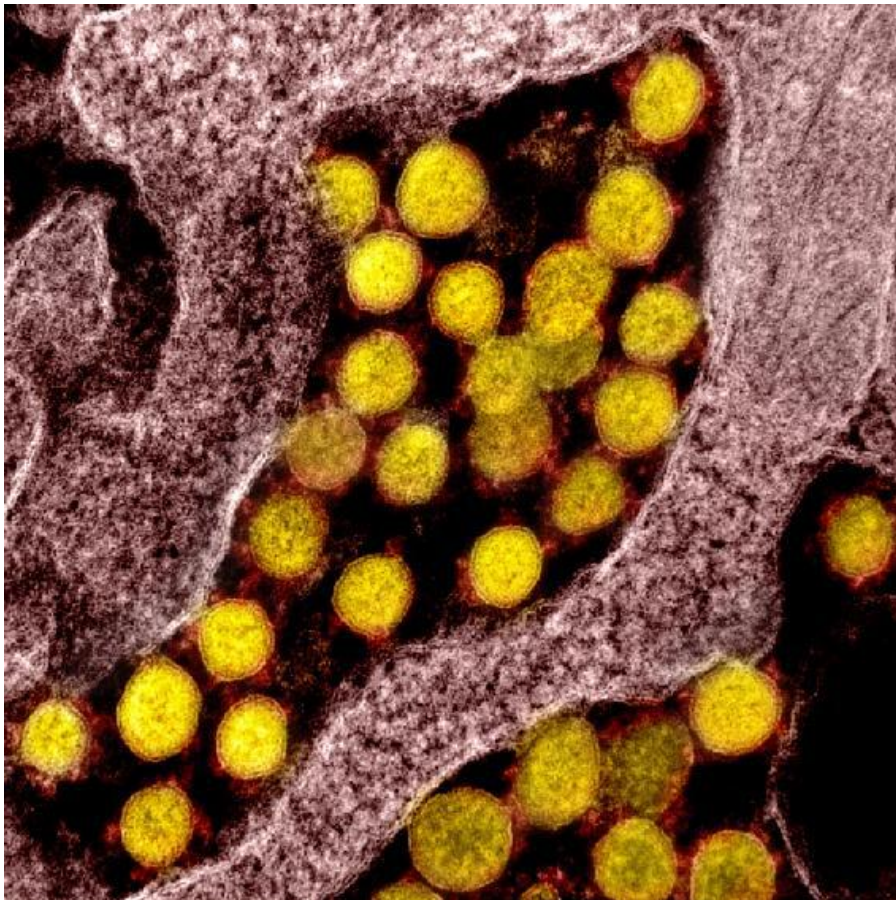
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of a SARS-CoV-2 virus particle, isolated from a patient. NIAID



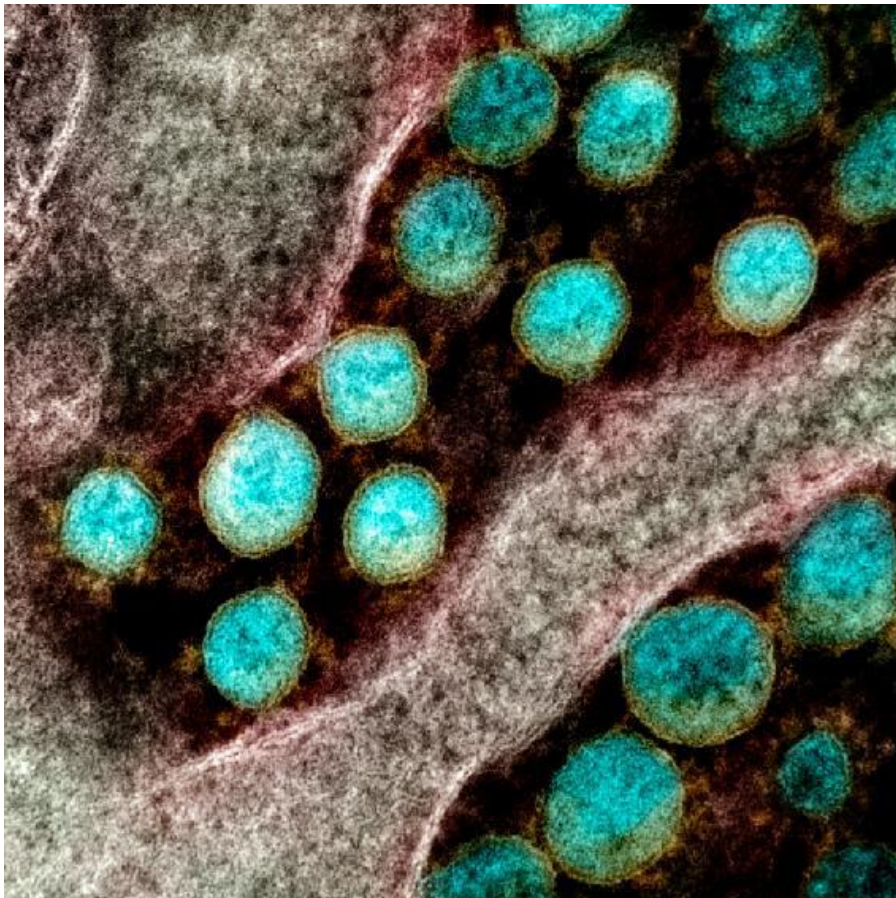
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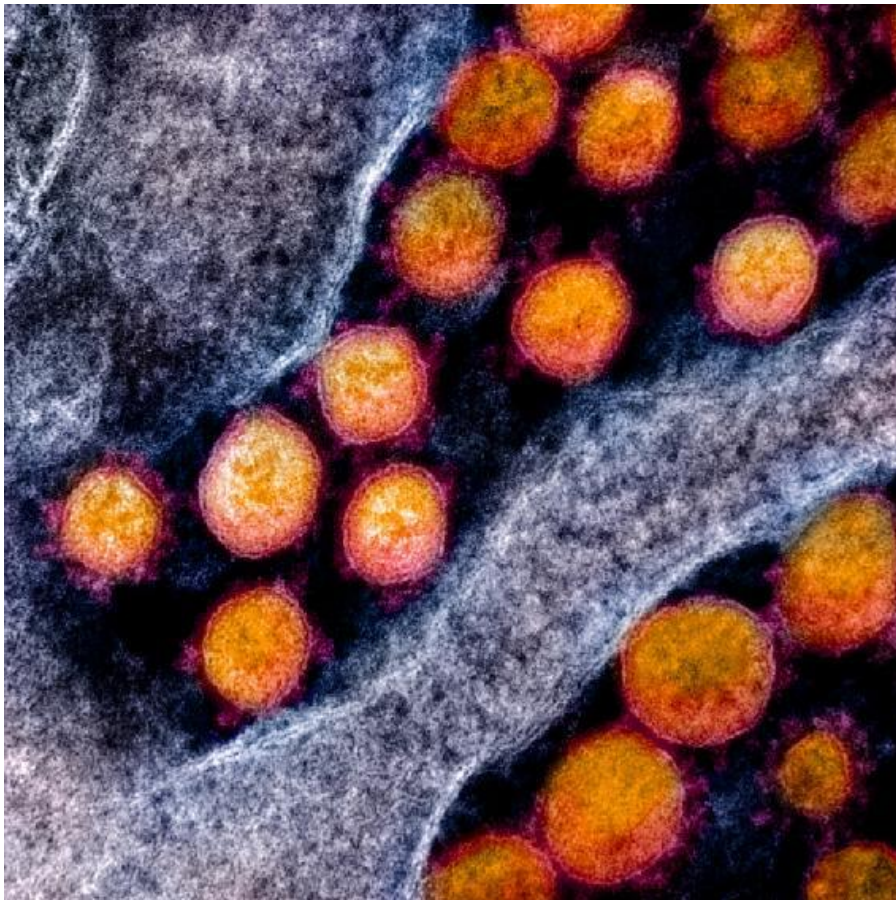
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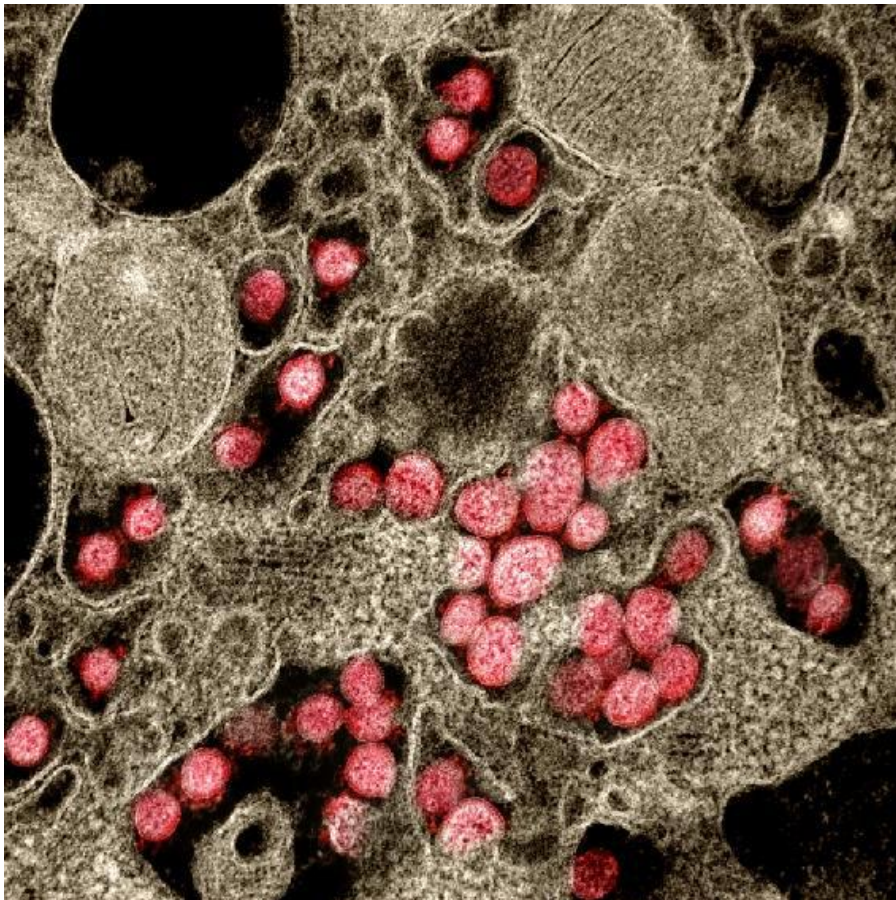
Novel Coronavirus SARS-CoV-2. Transmission electron micrograph of SARS-CoV-2 virus particles, isolated from a patient. NIAID



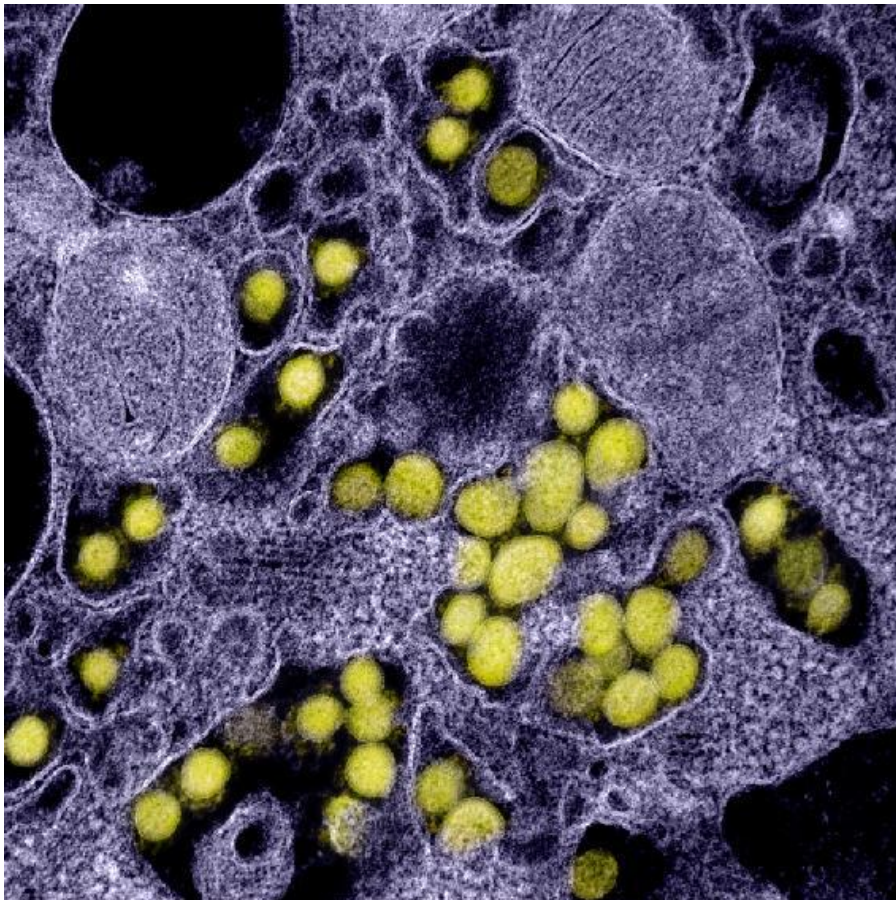
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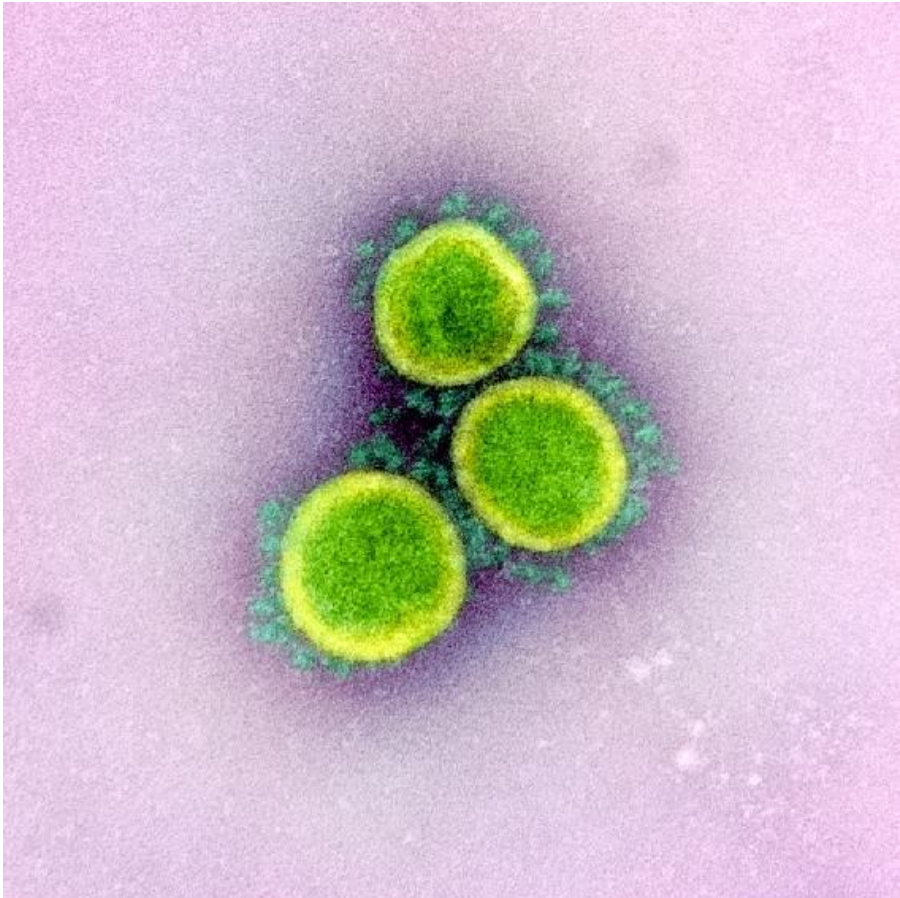
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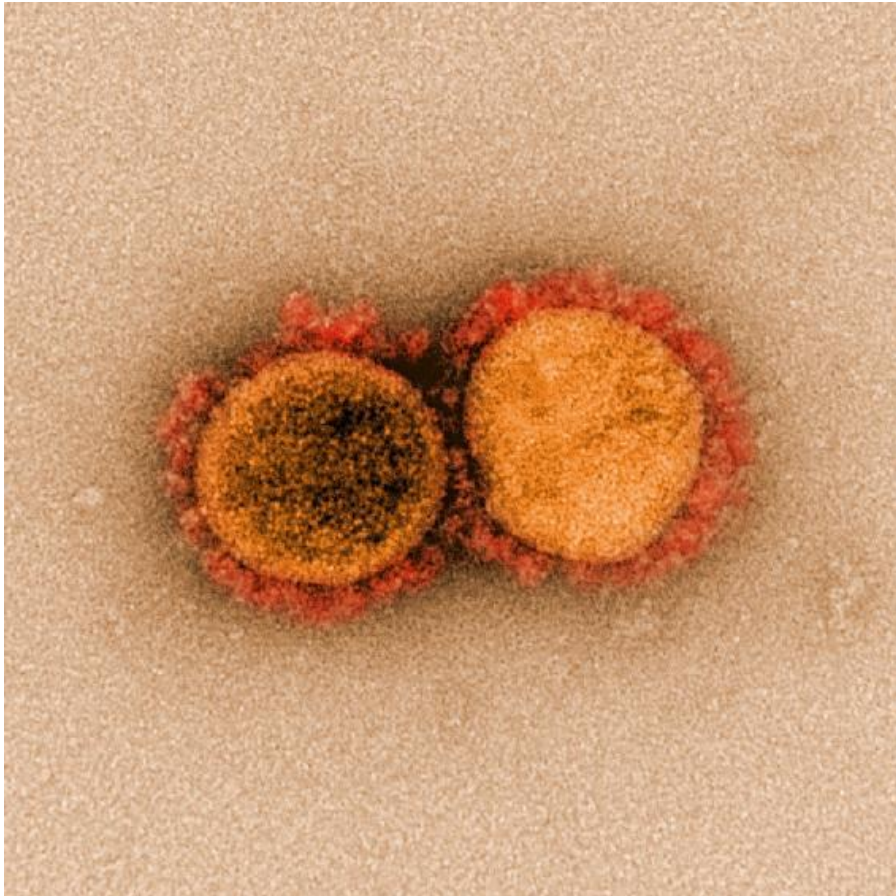
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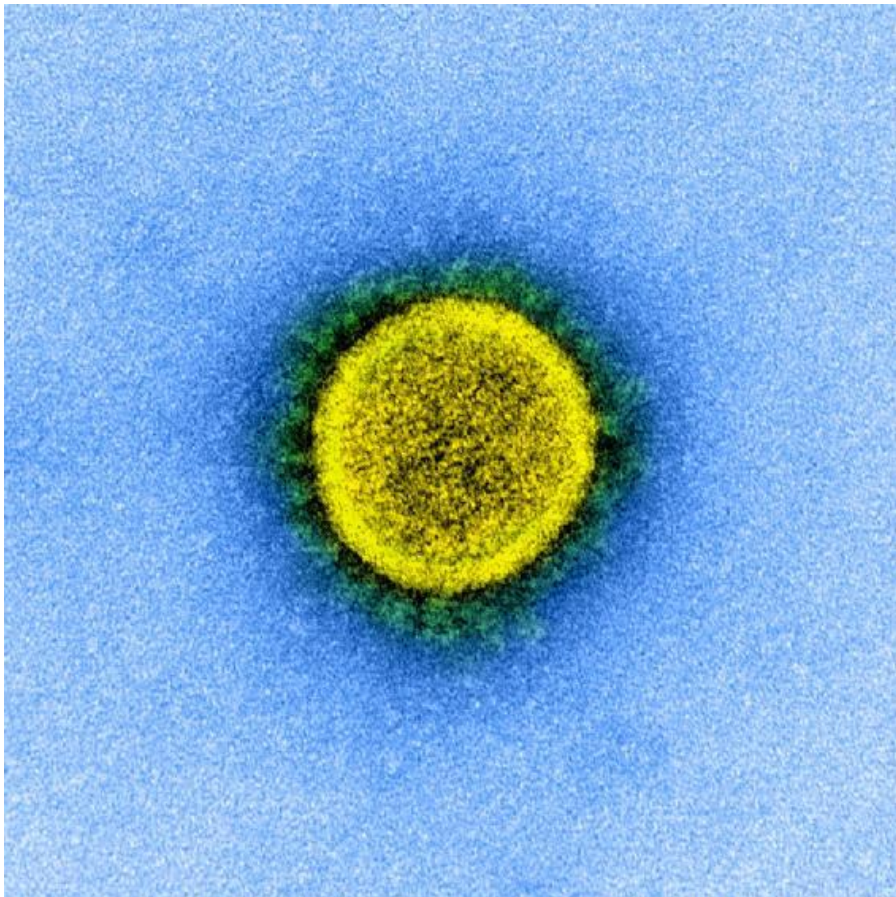
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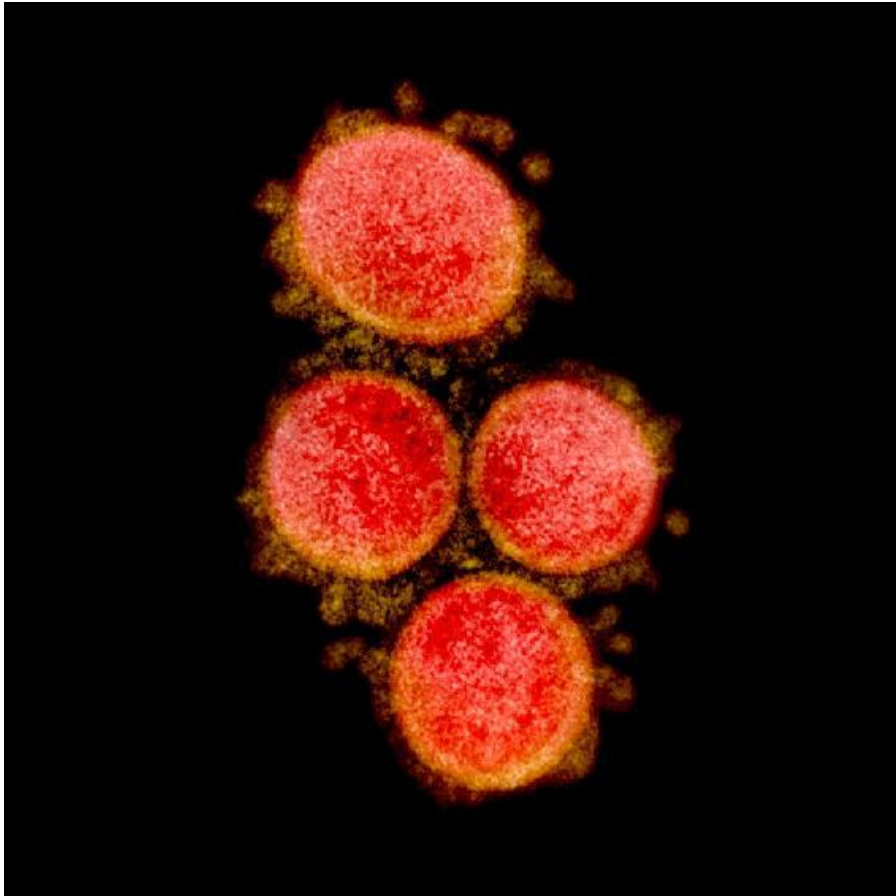
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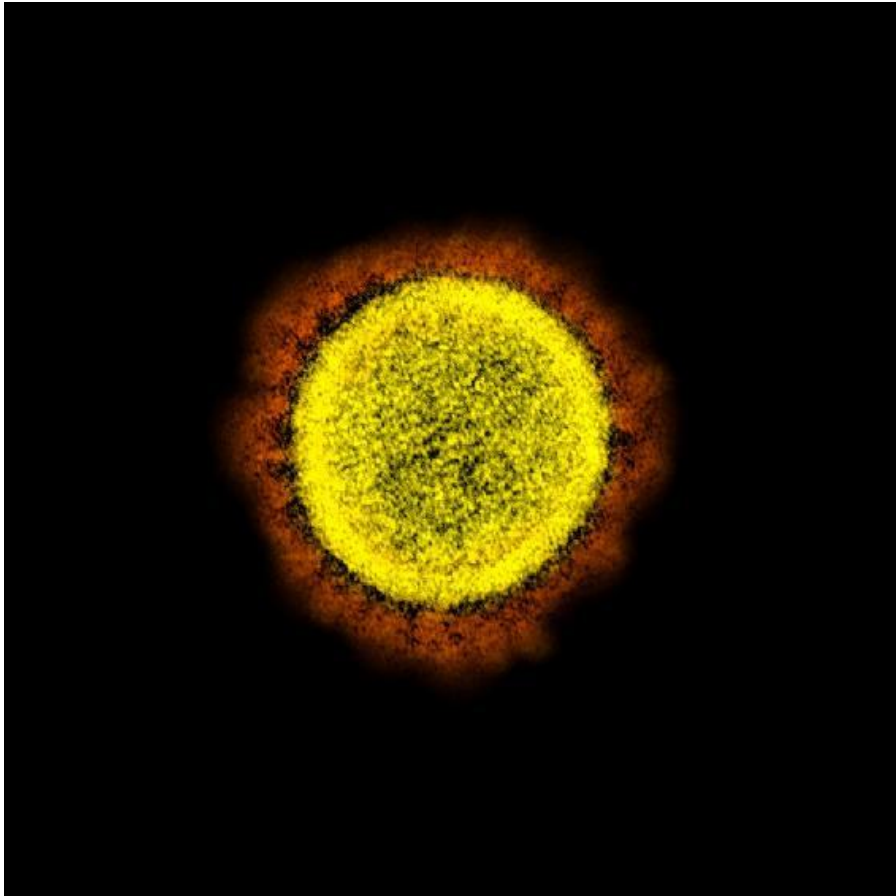
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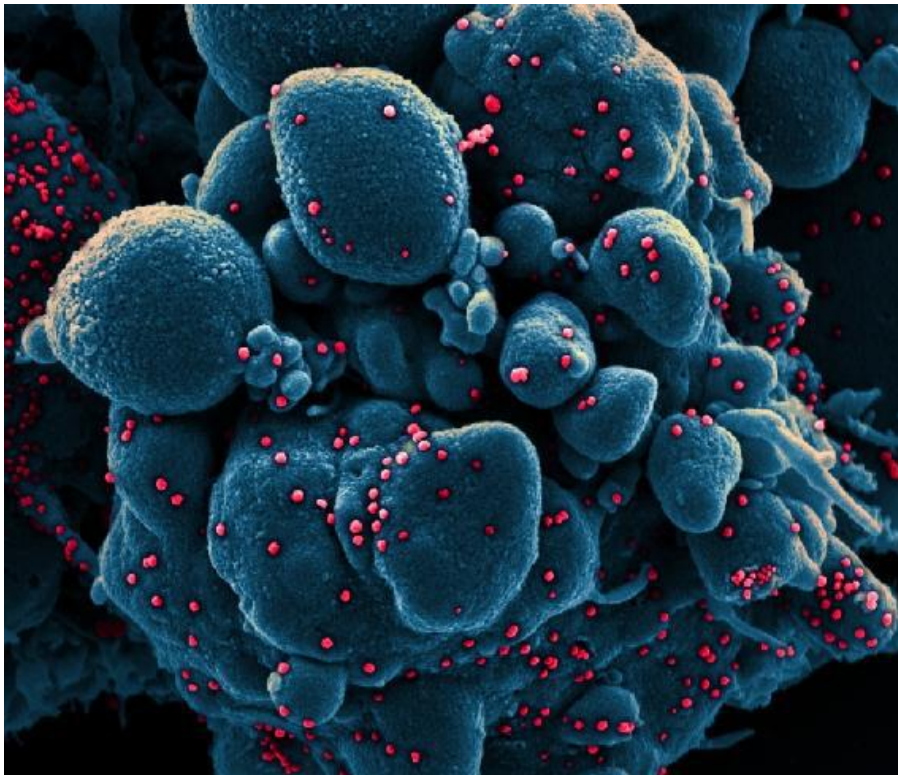
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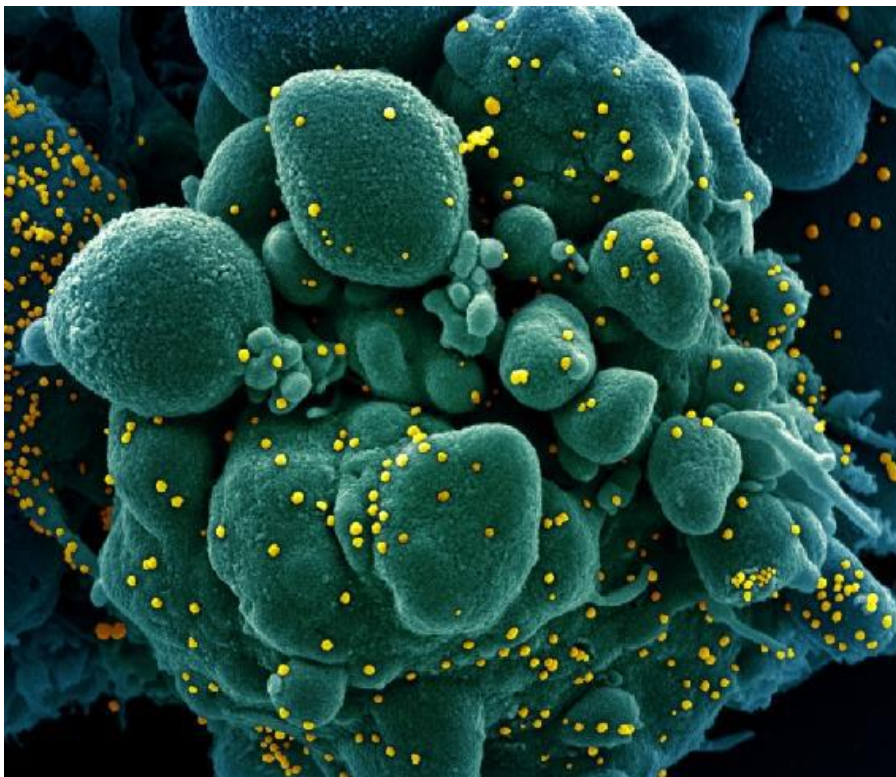
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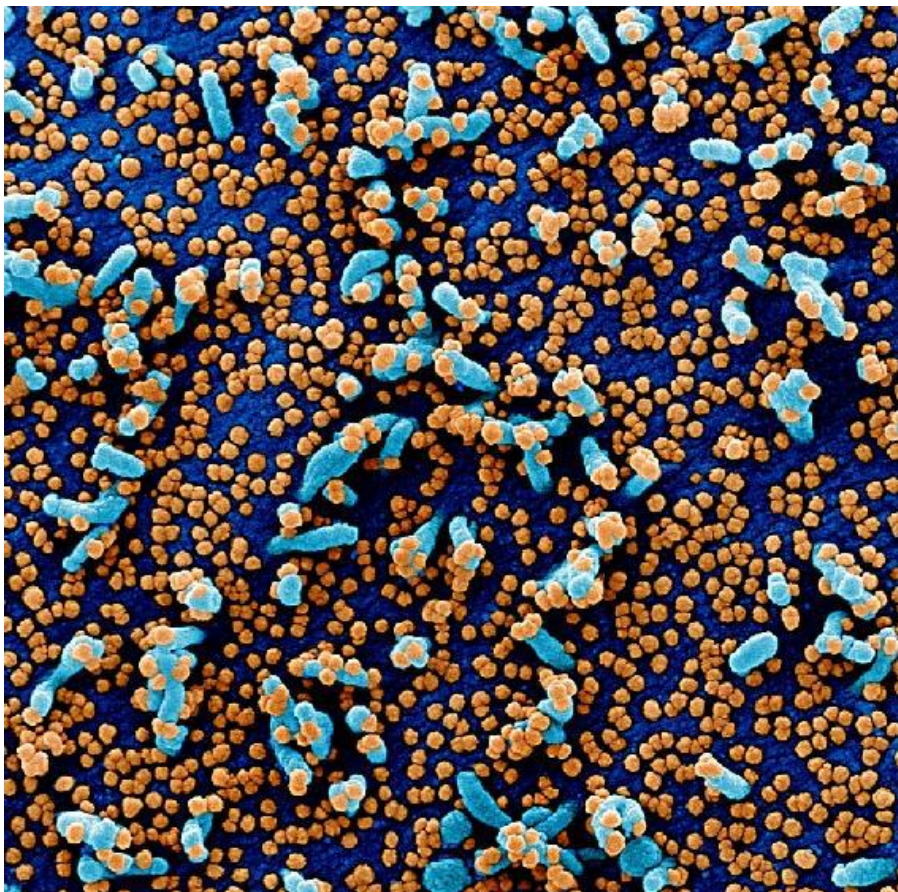
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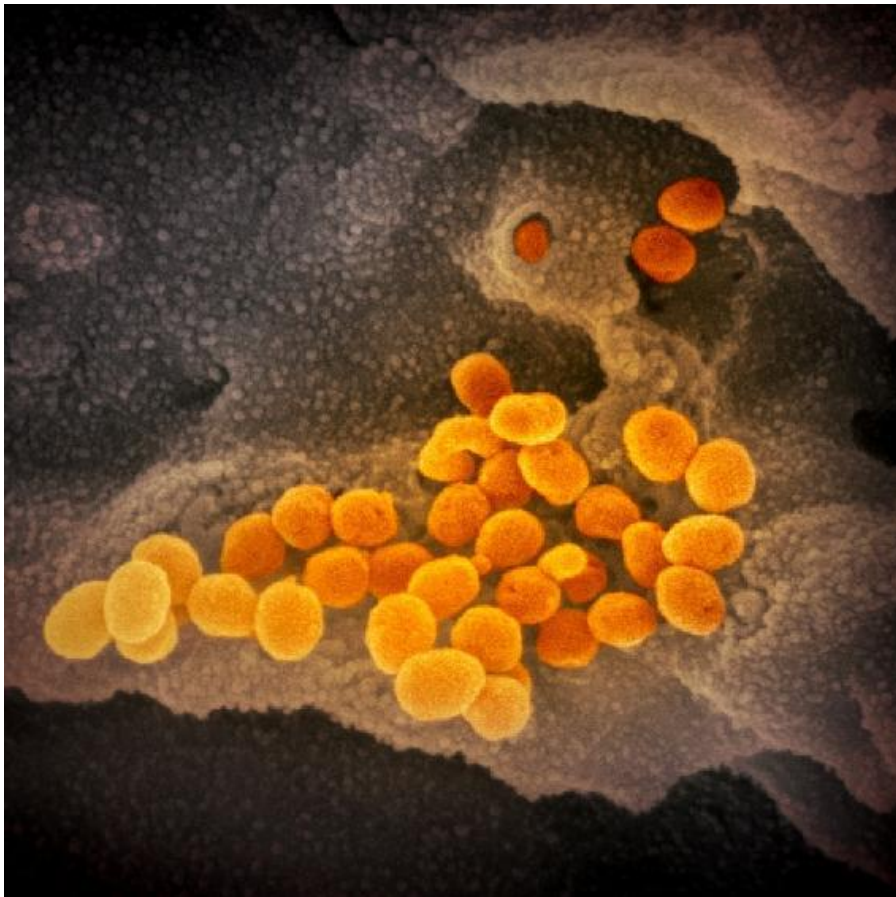
Novel Coronavirus SARS-CoV-2. Colorized scanning electron micrograph of an apoptotic cell (blue) infected with SARS-COV-2 virus particles (red), isolated from a patient sample. NIAID



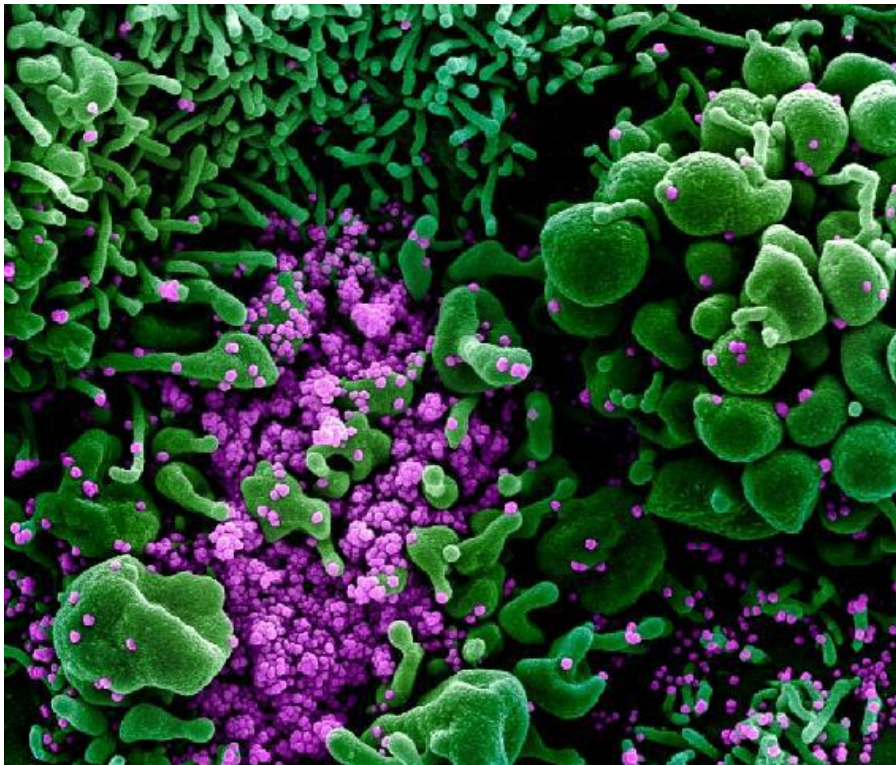
Novel Coronavirus SARS-CoV-2. Colorized scanning electron micrograph of an apoptotic cell (green) infected with SARS-COV-2 virus particles (yellow), isolated from a patient sample.. NIAID



Novel Coronavirus SARS-CoV-2. Colorized scanning electron micrograph of a VERO E6 cell (blue) heavily infected with SARS-COV-2 virus particles (orange), isolated from a patient sample. NIAID



Novel Coronavirus SARS-CoV-2. This scanning electron microscope image shows SARS-CoV-2 (orange)—also known as 2019-nCoV, the virus that causes COVID-19—isolated from a patient in the U.S., emerging from the surface of cells (gray) cultured in the lab. NIAID-RML



Novel Coronavirus SARS-CoV-2. Colorized scanning electron micrograph of an apoptotic cell (green) heavily infected with SARS-COV-2 virus particles (purple), isolated from a patient sample. NIAID

Discussion and Conclusion

There are a wide range of pathogens, in particular, viral diseases affect people every year. Every year, up to 650,000 people worldwide die exclusively from respiratory diseases and infection with the influenza virus alone. ³⁵⁹ , ³⁶⁰ , ³⁶¹ Other seasonal diseases are not yet included.

Most of the time it affects the elderly, vulnerable social groups and/or people with previous illnesses.

The current coronavirus gave the scientists, politicians and the people the creeps because it could not assess. There is a lack of immediate medicinal therapies and vaccines. In addition, this virus does not stop at less old people – albeit very rarely. In the case of pneumonia, permanent damage could persist...

Are these the reasons why public life is currently being paralysed, culture and events are no longer taking place and everyone should isolate themselves? Certainly, the world could not have been stopped every year. Too much is already being felt about the impact that Corona has on the economy and on each and every one of us. The cuts would be too big. No economy would be able to cope with this in the long run and over and over again.

However, any economy would be better off if people were more sensitive to infection issues, more considerate and more understanding. There is nothing against sensitivity, consideration and a knowledge of something. Yes, every society would do better if people were better, especially in this area.

But what is now emerging in the context of the current crisis is that people are beginning to rethink. They increasingly possess and internalize information and rules for general and special hygiene. For the first time in the history of mankind, a majority probably masters the hygiene rules, the knowledge of which was previously reserved only for doctors and nurses. If I am mistaken here, perhaps this current book can make a contribution to this, which will be of great importance to all hygiene in everyday life.

As a physician, I have a really painful discomfort when I have seen patients who had in all seriousness sneezed into their open palm during the manifested height of their illness. Everything that touched this hand was contaminated. Sensitivity and internalization of knowledge about transmission routes create a very deep-seated feeling of hygienic action and of what one should avoid absolutely and under all circumstances.

How many people died, because other people had not been careful, because sufferers showed a high-risk behavior, because

sufferers had infected many, many healthy people. How many of them have tragically died for many from today's point of view? Too many people have died. Everyone is one too many!

What we should definitely take with us from this crisis is a broad knowledge as well as the motivation and strength to apply all relevant hygiene rules consistently, today, tomorrow, the day after tomorrow – always and without exception. There is also nothing against maintaining practiced behaviours and a certain withdrawal from intensive contacts in the high phase of the flu – like a cultural asset.

We and many regions of the world live with the seasons. When it rains heavily we use an umbrella or a rain jacket, and when the sun shines in the summer, we don't wear winter ski clothes. So why don't we also adapt our behavior to seasonal health and diseases? I firmly believe that broad consense and the establishment of a disease-avoidance culture is a way of avoiding epidemics, pandemics and avoidable deaths, and overcoming beloved habits is the challenge of the future.

However, hygiene is not only taken to heard of medical laymen. Even at least some of the many preventable cases of sepsis, blood poisoning, and deaths from septic shock and resulting multiple organ failure in hospitals often testify to a lack of awareness, lack of control, lack of internalisation or lax interpretation of hygiene rules or even intentional and therefore criminally relevant disregard and omissions for whatever reason by medical personnel and must be condemned.

We must not forget one thing: Every person has only one life. It's the most valuable thing we have. Every person has a responsibility for himself and his fellow human beings.

The virus-related restrictions, the result of current legislative decisions or the state of emergency called by governments, might not have been necessary or so dramatic if all citizens internalized hygiene and their behaviour, appropriated for seasonal circumstances. Respect for the other and sensitivity in dealing with each other are virtues that should be brought to life here and everywhere. For a democracy and for freedom-lovers, the individual responsibility of every human being is existential. I hope this current book can make a modest contribution to this – for the futur.

About this Book

The coronavirus is spreading rapidly. It keeps the world's population in suspense. Politics reacts. Democratic freedoms are being restricted. People are insecure. Fear spreads. The world holds its

breath and is paralyzed.

This very informative book, written by a experienced physician, boldly aims to counter a catastrophe. It shedding light on the challenges and provides the information so urgently needed. Data and facts, clear hygienic and medical instructions for action about the best practice and for infection prevention as well as very concrete help can bring the reader safely through this pandemic and through every epidemic.

This helpful guide is for everyone in every situation - whether infected or not, whether with pre-existing conditions or healthy. This book gives advice for working and private life, whether young or old, medical and hygienic layperson or professional...

This book shows how everyone should behave at the moment and in the future and what to avoid in order to prevent, restrict or fight the virus.

This book, which is generally understandable, is also suitable for physicians and nurses, medical students and scientists to get a quick introduction to this topic and to quickly learn the state of current knowledge.

But this book wants even more: it shows, among other things, the political, social and cultural circumstances and necessary changes that can have a very big impact on people's psyches. And it draws conclusions and shows what needs to change to prevent pandemics and epidemics, or their scale in the future.

This book covers, among others, the following topics related to the coronavirus: transmission routes, symptoms and course of the disease, risk groups and severe courses, pregnancy, infectivity and its duration, incubation time, lethality, complications, their times and duration, asymptomatic or presymptomatic excretion and transmission, tenacity, resistance and inactivation on surfaces, social and individual prevention and protection for patients, for hospital visitors, for nursing, for home visitors, for parents, for home quarantine, for educational institutions, for travelers, for family, for animals, for sick persons, preventing the spread of coronavirus disease, clean and disinfect, manage anxiety and stress, diagnosis, diagnostics, treatment and therapy, prognosis, impact on life, culture, sports, politics and the economy ...

This book was written by a physician from Germany - one of the worldwide corona hotspots.



Dr. André Hoffmann is a German physician. The research of body tissues and biogenic structures with the help of optical technology and electromagnetic radiation is part of his expertise. He is an innovator and pioneer in the field of photonics.

Anmerkungen

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Image captured and color-enhanced at the NIAID Integrated Research Facility (IRF) in Fort Detrick, Maryland. Credit: NIAID

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Probably only addresses U.S. citizens and people living there.

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Content source: National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases

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